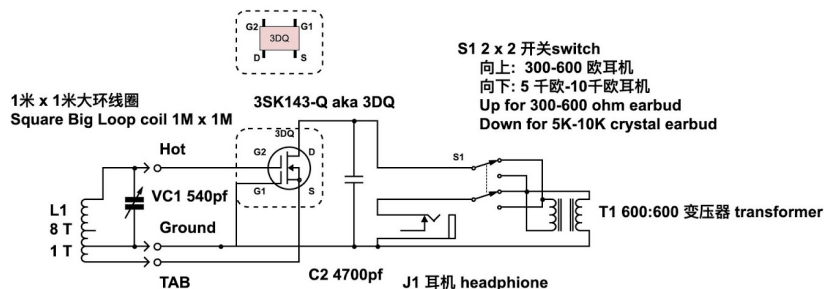


3DQ Big Loop Crystal Radio for AM MW Radio
3DQ 大环中波矿石收音机
billydiy.blogspot.hk



The circuit utilise the 3DQ radio module to connect to a loop coil for AM radio.
There is no need to connect separate antenna and ground if the loop coil is big enough e.g. 1 meter diameter.
3DQ output impedance is 1.5K to 2.5K depending on frequency
To match with a 300-600ohm high impedance Headphone, create a
4:1 auto transformer by daisy chaining the primary and secondary coils
of a 1:1 permalloy 15H transformer
The circuit utilise the 3DQ radio module to connect to a loop coil for AM radio.

这是一利用通用MOS FET 矿石收音机电路
连接一个用电线绕的一米 \times 一米大线圈和 540pf 可变电容器做的 无需天线,
无需电源收听收音机广播的矿石收音机。
3DQ输出阻抗为1.5K至2.5K, 具体取决于频率要配合
300-600欧高阻抗耳机, 请创建一个4:1自耦变压器
通过连接初级绕组的一端和次级绕组1:1镍合金15H变压器

[<https://3.bp.blogspot.com/->

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am%2Bradio.jpg]

Posted 18th April by [Billy](#)

0 Add a comment

18th April Universal 3DQ MOS FET Crystal Radio Tuner Module for AM SW and FM

这是一款适用于AM SW FM的通用MOS FET矿石收音机电路

连接该无线电频带所需的线圈和可变容量就可无需电源收听收音机广播。

3DQ输出阻抗为1.5K至2.5K，具体取决于频率

要配合**300-600**欧姆高阻抗耳机，请创建一个

4: 1自耦变压器，通过连接初级绕组的一端和次级绕组

1: 1坡莫合金15H变压器

This is a general MOS FET crystal radio circuit that works for AM SW FM by connecting the appropriate coils and variable capacity required for that radio band.

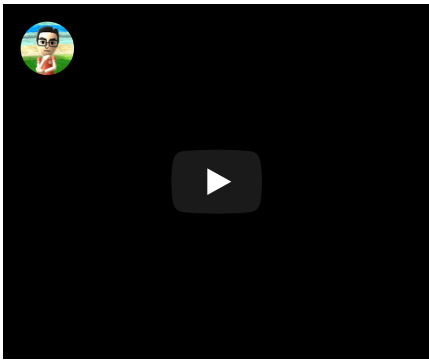
3DQ output impedance is 1.5K to 2.5K depending on frequency

To match with a 300-600ohm high impedance Headphone, create a

4:1 auto transformer by connecting one end of the primary with the secondary windings of a 1:1 permalloy 15H transformer

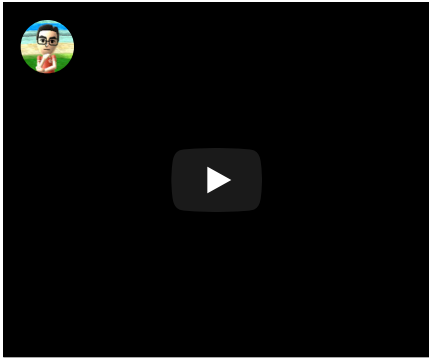
中文廣東話視頻 Chinese Video Link

https://www.youtube.com/edit?o=U&video_id=DIG2ZJQ80D0 [https://www.youtube.com/edit?o=U&video_id=DIG2ZJQ80D0]

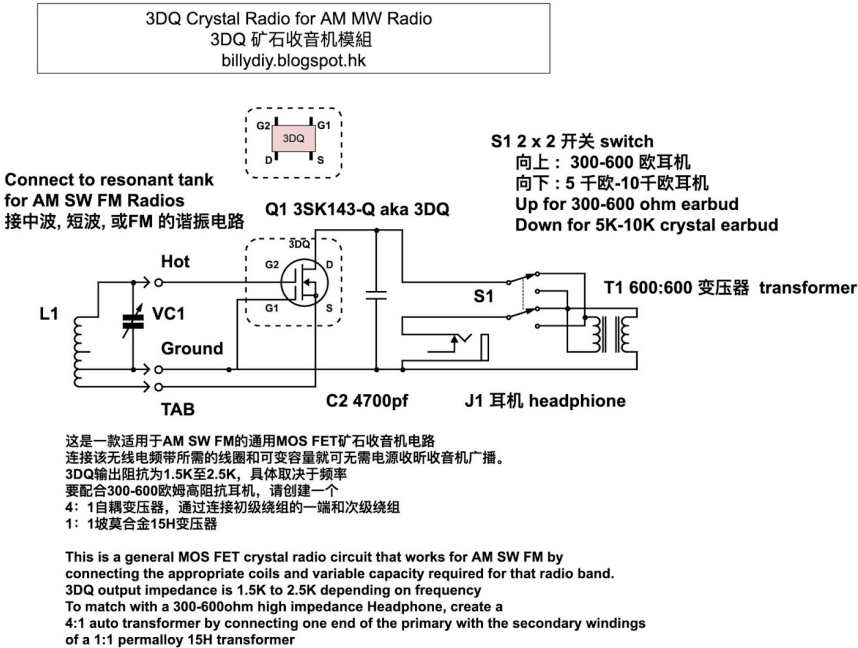


You Tune Video link:

<https://www.youtube.com/watch?v=Qbav84IXeMc> [<https://www.youtube.com/watch?v=Qbav84IXeMc>]



Circuit Diagram.



[https://1.bp.blogspot.com/-YVszuEPEcXw/XLlgjC6Z85I/AAAAAAAAADGc/uyxvf_EfxOQATcm2tO0NcEOhp6h-TugCLcBGAs/s1600/3DQ%2BFM%2BCrystal%2BRadio%2BTuner%2BModule.jpg]

Posted 18th April by Billy

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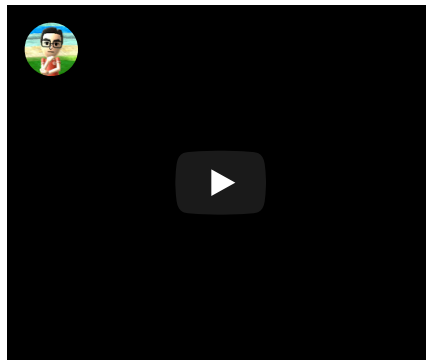
Hot Deal At Oakland
Ca!!! in Oakland in...
\$478,000

[Learn more](#)



13th March 1 meter loop AM crystal radio step by step construction guide

1 meter loop AM crystal radio step by step construction guide



Steps to Design an AM crystal radio

1. The band & frequency range 2. Choose the tuning method 3. Choose the Variable Cap. 4. Calculate the Inductance 5. Make the coil 6. Connect the circuit and Test

Checkout the above video for the instructions and testing.

And comparison of different tuning method, Variable Inductors and Variable Capacitors.

<https://youtu.be/161vWissKLU>

Posted 13th March by [Billy](#)

0 Add a comment

3rd March

What do you need to know to build a crystal radio

Thanks for your interests in Crystal Radios.

Many people asked me how to build one. Many people tried and failed to receive any signals. I hope the following will give you the tips to avoid many of the challenges and let you enjoy the charm of having a functioning crystal radio. A radio that functions without batteries.

Here are the basic preparation work to build your first Crystal Radios or Power Free Diode Radio or Power Free MOS FET radio or Power Free LED Radio.

A Crystal radio is same as a regular radio you can purchase from the electronic shops, minus any form of electrical implications. Some Crystal radio uses physical audio amplification by using a horn, but no high frequency nor audio frequency amplifications.

A Crystal radio requires the following:

Antenna

Earth

Coil

Capacitor (s)

Detector (Crystal, Diode, zero voltage MOS FET, LED).

headphone or earbud

Transformer for impedance matching (optional)

But No batteries

1. Antenna and Earth.

Unlike a conventional radio that has builtin amplifications powered by batteries, crystal radios just turn whatever radio wave it receives from the antenna and coil into electrical signals without signal amplification and without using any batteries or other forms of electricity supply.

You need to be very close to the transmission station to be able to do this. Usually within 30KM.

For my case, my apartment is within 10 KM from two different radio transmission stations.

While some people can receive stations from 50KM or 100KM or 1000KM away, they have very long antennas (talking about miles) and earth system which is impossible to achieve in a city like HK.

The living environment in most Asian cities populated with concrete jungles is not too suitable for receiving crystal radio directly from your home.

Most city dwellers live in high rise apartments with not much open view between your apartment and the radio transmission stations.

If your apartment is blocked by another high rise apartment in the direction of the transmission stations, you will not be able to receive any stations through your crystal radio.

You can see this link for the AM and FM radio transmission stations in the world. This one is in particular about HK.

Link:

<http://worldradiomap.com/hk/hong-kong> [<http://worldradiomap.com/hk/hong-kong>]

<http://www.asiawaves.net/hong-kong-radio.htm>

For AM crystal radios , you will need a very long antenna and a good earth connection.

Depending on how close your apartment is from the target transmission stations, the antenna need to be at least 5M, or even 10M or more). If your apartment is facing the same direction of the radio transmission stations, you can hang a cable down from your window as an antenna. However that will alienate your neighbours as they may think you are hanging IP cameras to spy on them. It may also get yourself into trouble with the building management staff, or even the law enforcement units in your country.

If you are real close to the transmission station and even have a clear line of sight view of the transmitter (e.g. if you travel close to the transmission station), you can use any thread of 1 M or longer or a telescopic radio antenna to receive the AM radio.

For FM radio reception, you must be very close to the FM transmission station, e.g. < 5KM. As FM signals reduces much faster in distance than AM.

A good passive FM Yagi antenna with the main beam (called the radiator) measured 1.7M is required for good reception from home.

Or an active FM radio antenna with HF signal amplification is required. However this defeat the purpose and the charm of having a crystal radio in the first place. The no. 1 charm of having a crystal radio to me is to listen to radio without batteries or any other form of electrical power.

If you are very close to the FM transmission stations, e.g. for my case, around 3KM from the FM transmission station, you can get quite good a reception using a 1.2 meter to 1.8 meter telescopic radio antenna. FM radio signal reception is an art. Standing in different places just a few feet apart, or turning your antenna just a few degrees away, or holding your headphone cable horizontally versus vertically will effect the signal quality or even tune you to a different station.

Earth (a.k.a. Ground),) is not required by FM radio, However, some tests show that for FM radio, if you tie one end of your coil

Earth will enhance reception for AM and SW radios. However, if the signal from your antenna is already strong enough, you may not need an earth.

For weaker reception, earth will definitely help.

If your apartment is still using metal water pipe, congratulations. You can simply connect your ground to that water pipe, just connect a few turns of bare wire (without the rubber skin) onto the water pipe. Unfortunately all your water pipes are made of plastic (e.g. many new buildings in mainland China as they build buildings with much cheaper materials), then you may be able to try some gas pipe, or electrical each (be careful of electric shock in case you incorrectly connect to the line that carry electricity instead of the earth/ground. In a worst case, you can try pulling a second antenna and use that as earth. Sometimes that may improve the reception.

The other alternative is to build a Loop crystal radio (0.5M to 1M in diameter, e.g. the size of an umbrella), where the coil itself can replace the function of the antenna if you are close enough to the transmission station (< 10KM) and have a direct view to the transmission station that is not blocked by another high rise building. However some people are able to pick up radio stations through the reflected radio waves bouncing off the walls of the buildings even though they are blocked.

The draw back is you'll need more money to buy the long wires in order to build one. E.g. for a diameter of 1M, you need to have at least 40M of wires to have 12 turns for the coil, roughly HKD 100,

2. Head phone.

You will need a very sensitive head phone. The earbuds and headphones we used to listen to music from your smart phone or your hifi at home, will produce a very faint sound.

As these are designed for receiving a high power output, focus is on the quality not sensitivity.

You will need special head phones for crystal radio reception.

These can be purchased from taobao, or you can make your own using a ceramic piezo-electric buzzer (still available in the ShimshuiPo IpLiu Street shops (華輝)), the plastic tip of a ball pen, a silicon earbud cushion, glue, some wires and the headphone jack.

You can refer to my video on how to make one.

Link: <https://www.youtube.com/watch?v=k3HsVlxR2tA> [<https://www.youtube.com/watch?v=k3HsVlxR2tA>]

If impedance of your headphone does not match with the of the detector, you will need a step up or step down transformer for impedance matching.

Impedance matching is very important for crystal radio.

As Crystal radio has no signal amplification, we need to maximise the efficiency of the transfer from one stage to the next. and that require impedance matching to ensure we transfer all the energy down to the next stage of the circuit. Any impedance mismatch will mean energy loss, and lowered output, softer sound.

3. Coil

For AM, radio,

You can build a small coil (0.01M to 0.1M) to go with a long antenna and earth, or a big loop coil (0.5M to 1M diameter, see above)

You can use insulated magnetic wire (available from the DIY shops

Due to skin effect (radio signals only travel at the surface of the wire instead of the core), Litz wires that have multiple insulated smaller wires wrapped within a cotton thread will perform much better, almost doubled in terms of loudness than the solid Magnet wire

Each one has up to 660 tiny wires each measures 0.04mm in diameter. These are available in the taboo shops, around HKD 150 per roll that is enough to make one big coil for umbrella loop radio.

For small coils, the one with 60 tiny wires each 0.04mm can be used to wind on a dark ferrite rod (1cm diameter), the ones you see on most conventional radios.

measure Capacitance as well.

For AM radio, inductance required is from 180uH to 510uH, depending on the size of capacitance you match with.

180uH match with 512pf capacitor

330uH match with a 365pf capacitor

510uH match with a 220pf capacitor.

4. Variable capacitor v.s. fixed capacitor

Variable capacitors is also very important for a good radio. It is the knob that you turn to tune to the frequency for your crystal radio.

Air insulated variable capacitor made of copper has the highest Q factor. It's available in taboo but hard to find and very expensive > HKD 150.

Smaller versions of these < 20pf can be used for FM radio (HKD 20).

Next is the air insulated variable capacitor made of aluminium. Around HKD 30-50 depending on the size.

In general the bigger ones with the divider wider apart has a high Q.

Q is a factor that measures how good is the efficiency (sensitivity) and accuracy (selectivity) in transferring radio wave signals to electric signals.

The conventional plastic variable capacitor we see on the conversational radios will also work, but loudness will be diminished a bit (at least 30% less loud).

Alternatively, you can use a fixed capacitor, but vary the inductance of your coil to tune to different frequencies.

You tune the inductance by different methods:

1. Move the coil in or out of the ferrite stick. Very easy to do, see my videos.
2. Vary the length and separation of the turns within the coil (much harder to achieve practically).
3. Wind two coils. Then overlap these two coils on top of one another and the total inductance of the these two coils in series = the addition or subtraction of the two coils. Addition if they are facing the same direction (e.g. clockwise), subtraction if they are different direction (e.g. anticlockwise on one coil which is laid on top of a clock wise coil). The amount to add or subtract also depends on how much of the area of the two coils are overlapping.

5. Detector.

Detector is the component that translate high frequency radio signals to Audible signals.

This conversion is called demodulation.

The action taken by the detector is really simplify only allow electric current to flow in one direction and stop current flow in the opposing direction.

This way, only the positive half of the radio signal is allowed to pass through.

The audio signal will be able to be reproduced by the headphone.

There are different types of detector.

I list them here in term of the performance. Best performance first.

With the exception of vacuum tube, all can function without battery or mains electric power.

This the charm and magic of crystal radio, or battery free radio.

Zero voltage MOS FET

Diode

LED (only works in very strong signals (> 200uA), lits up during radio reception and glow according to the strength of the signal.

Vacuum Tube (that need to be battery powered to lit up the heating coil, but no power required for detection).

Crystal

The name "Crystal Radio" v.s "FET radio" v.s. "Diode Radio" v.s "power free radio"

There is constant debate over the name given to all kinds of radios that can operate without battery or other kinds of man made electrical power (solar cell, acid cell from fruit, hand-held push/pull power generator or mains power supply).

With newer form of detectors that we discover in recent years, besides genuine crystals with cat whiskers, zero voltage MOS FET e.g. 3DQ (3SK-143-Q), Diode (e.g. 1N34A), or even LED are used as detectors. Should we or should we not keep calling them Crystal Radios ?

My vote is to still call these Crystal Radios.

Simply as it simplifies a mouthful of words such as power free zero voltage MOS FET radio.

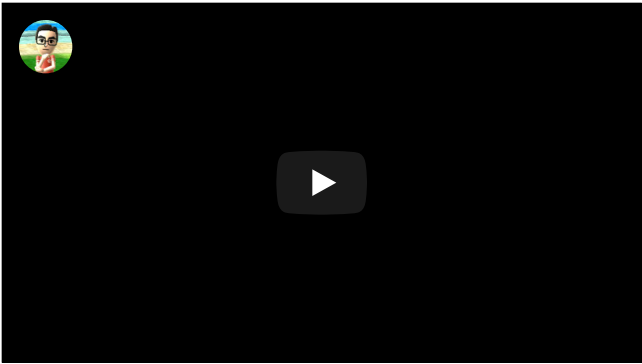
And Crystal radios reminds every one of the Charm of listening to radios without power.

Posted 3rd March by [Billy](#)

0 Add a comment

25th April 2018

New Growthbed



Posted 25th April 2018 by [Billy](#)

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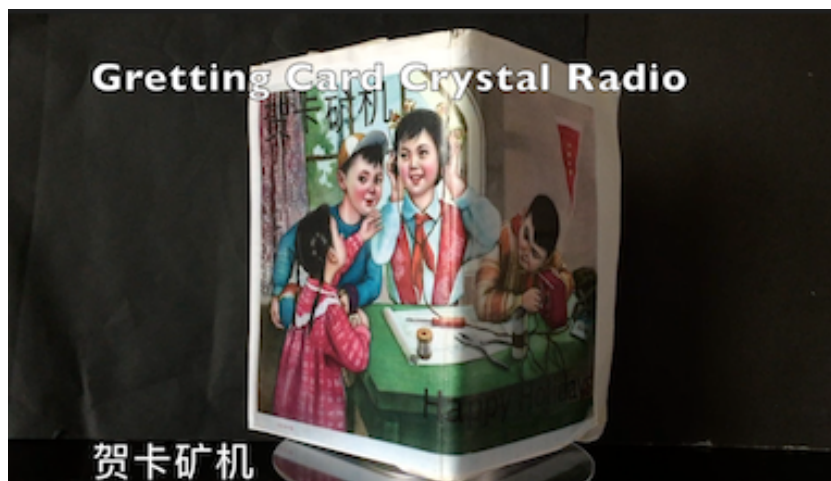
2nd March 2018

Self-cleaning CHOP aquaponics systems using IKEA transparent plastic storage boxes.

Self-cleaning CHOP aquaponics systems using IKEA transparent plastic storage boxes.

Here is the link to my youtube video.

<https://www.youtube.com/watch?v=YC5RGUUXxJE&t=24s> [<https://www.youtube.com/watch?v=YC5RGUUXxJE&t=24s>]



[https://1.bp.blogspot.com/-wyQH-V_HcKE/VySGA-f3s4I/AAAAAAAAAClo/bEIRnV_NMv4C6T3rj1IQY72w9CLX4HgFAClCB/s1600/Screen%2BShot%2B2016-04-30%2Bat%2B4.57.29%2BPM.png]

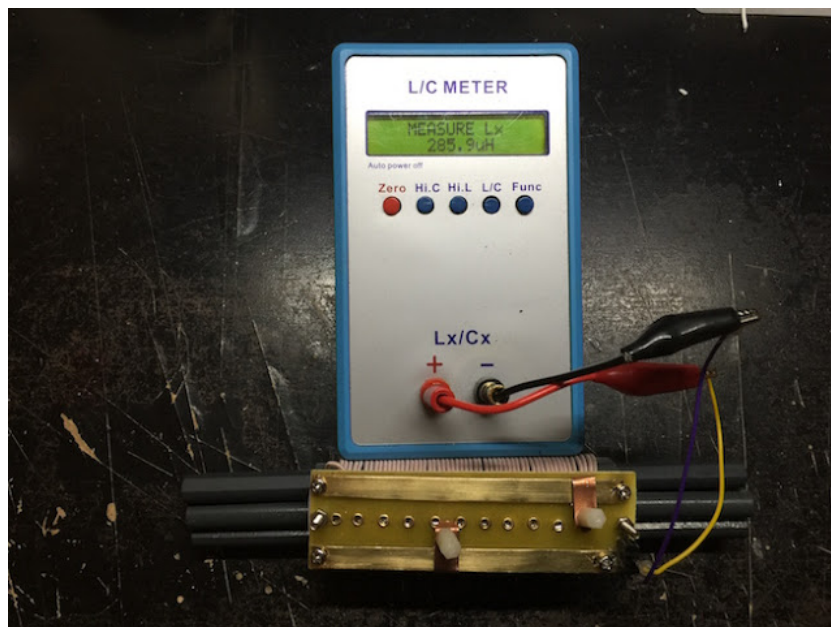
Posted 29th April 2016 by Billy

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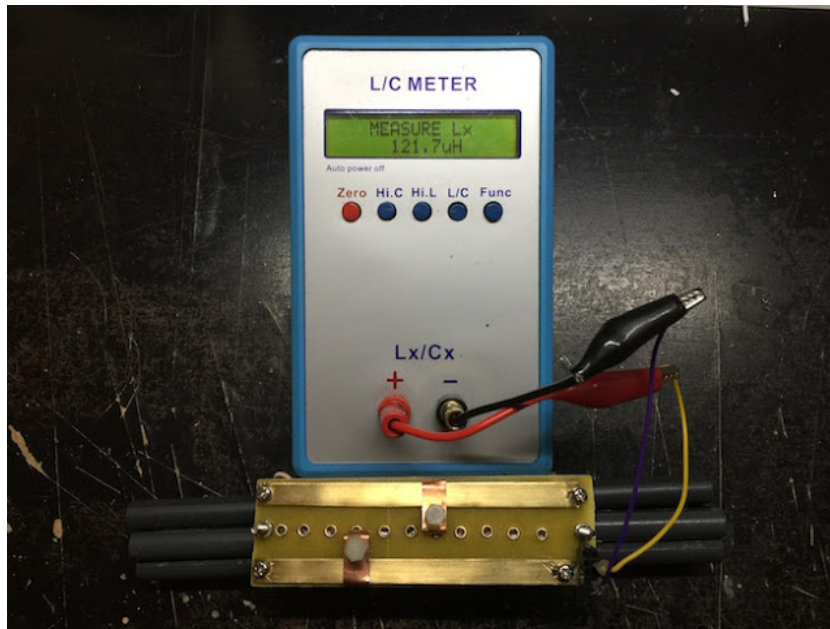
11th April 2016

Dual pole sliding band switch

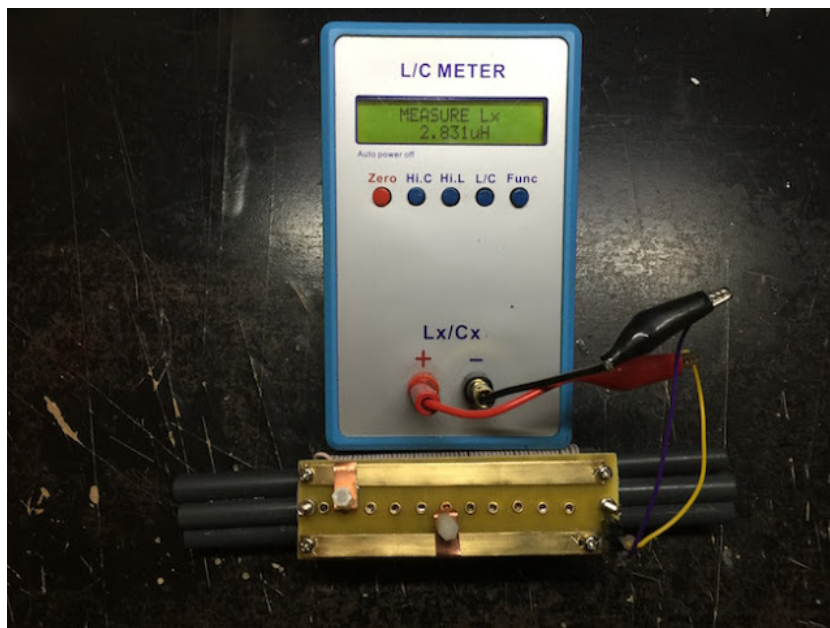
I made a Dual pole sliding band switch using 1mm copper sheets. The switch is for soldering directly onto the taps of a ferrite stick coil wound using 660x0.04 Litz wire.



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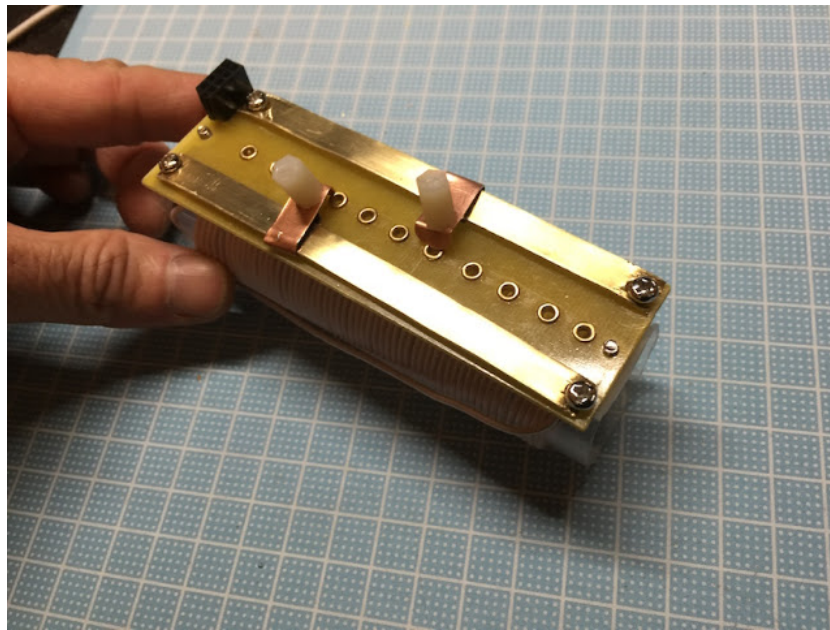
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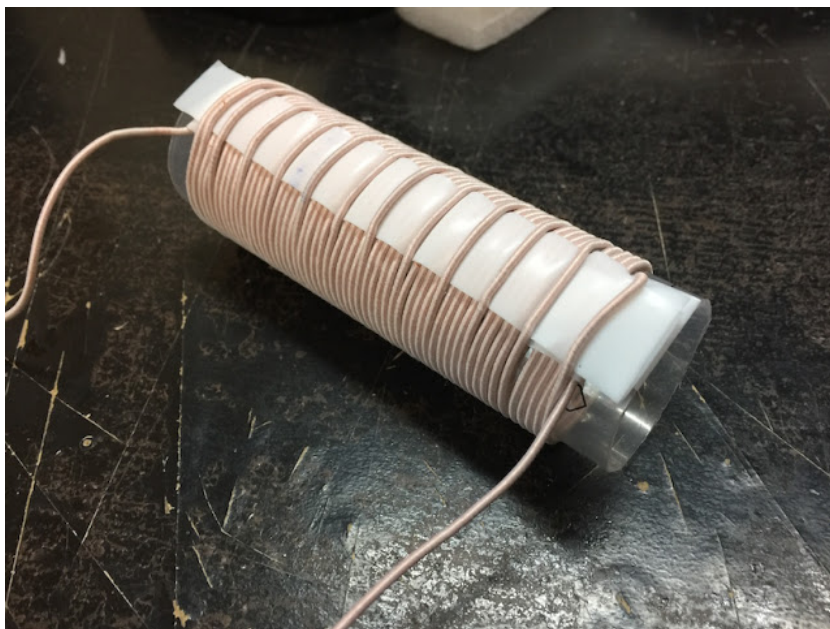
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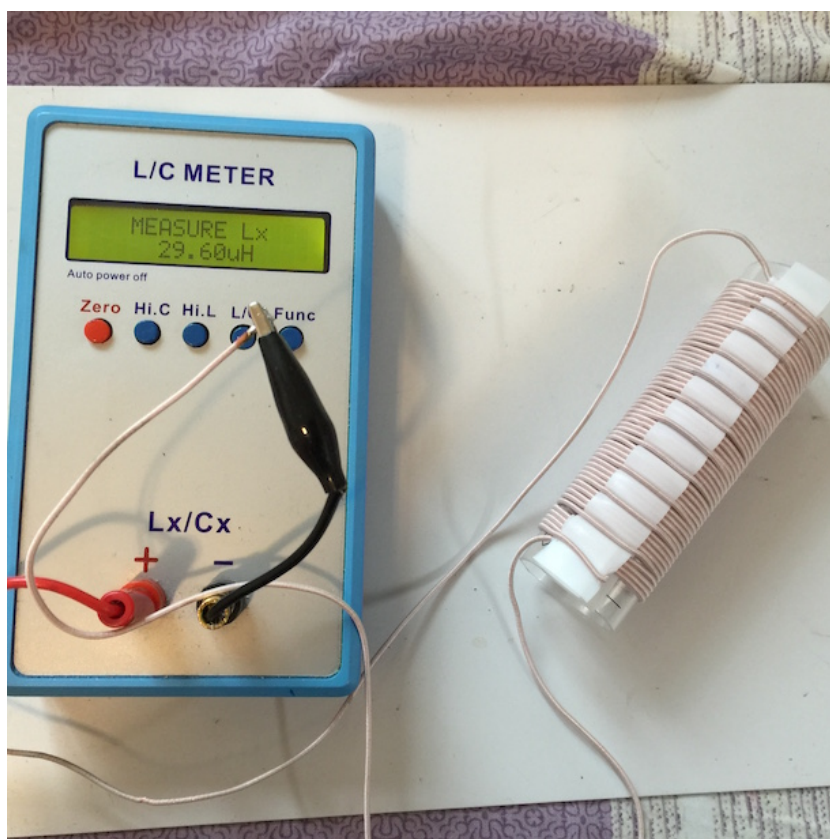
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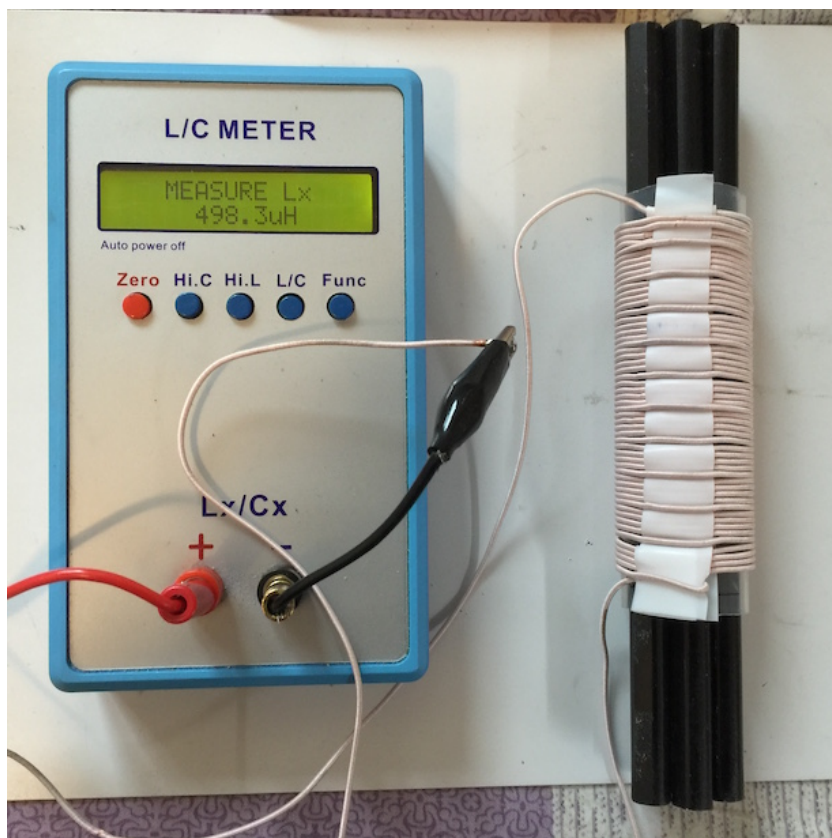


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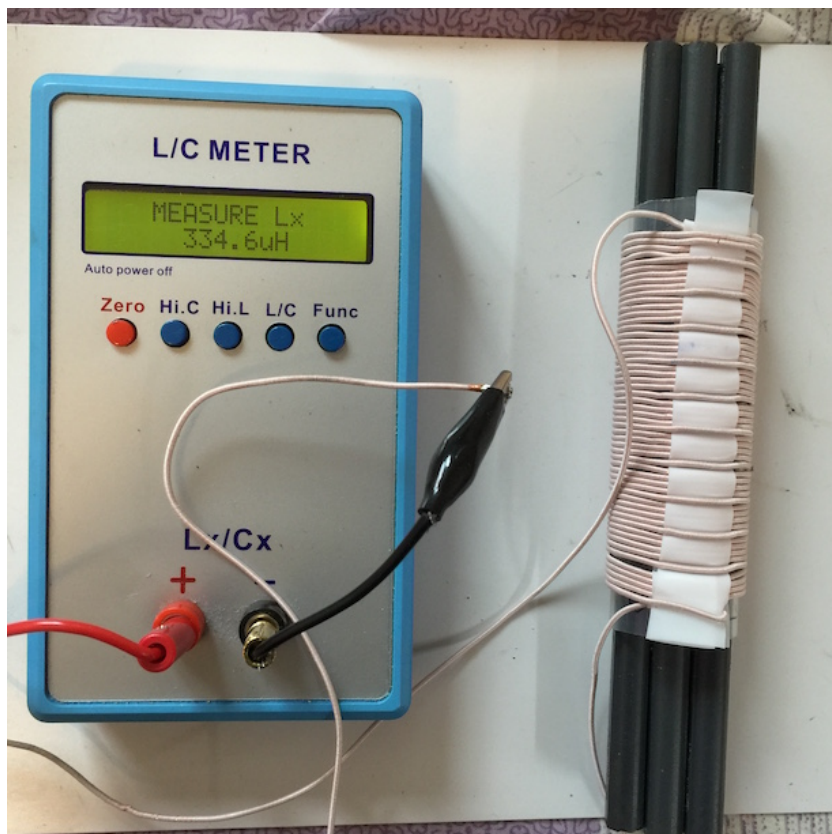
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Inductance measured using 5 regular MW radio ferrite sticks



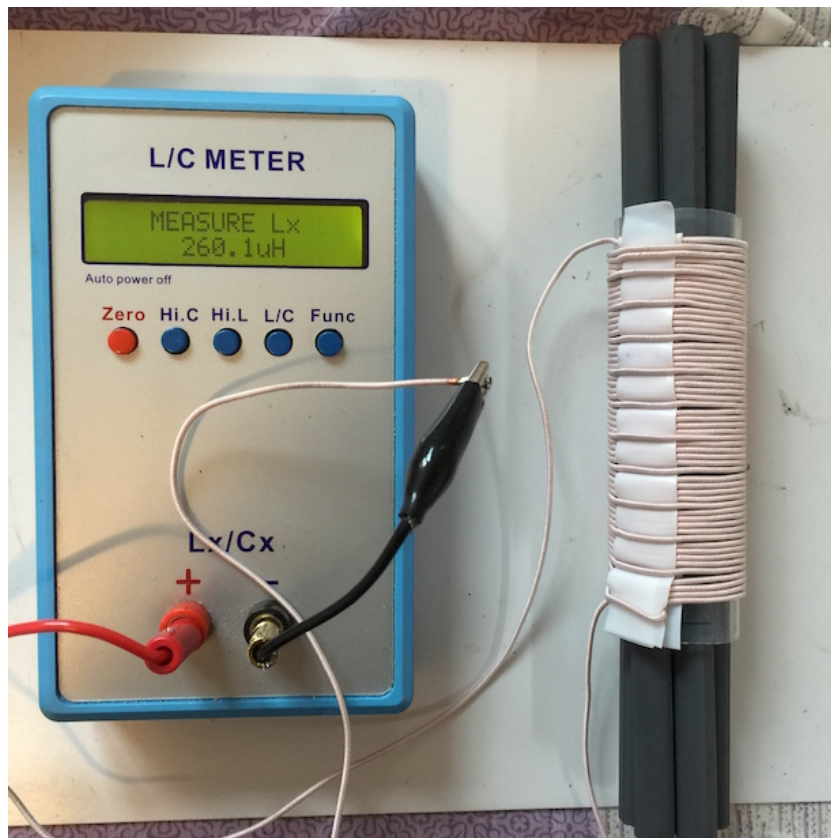
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Inductance measured 5 SW radio ferrite sticks

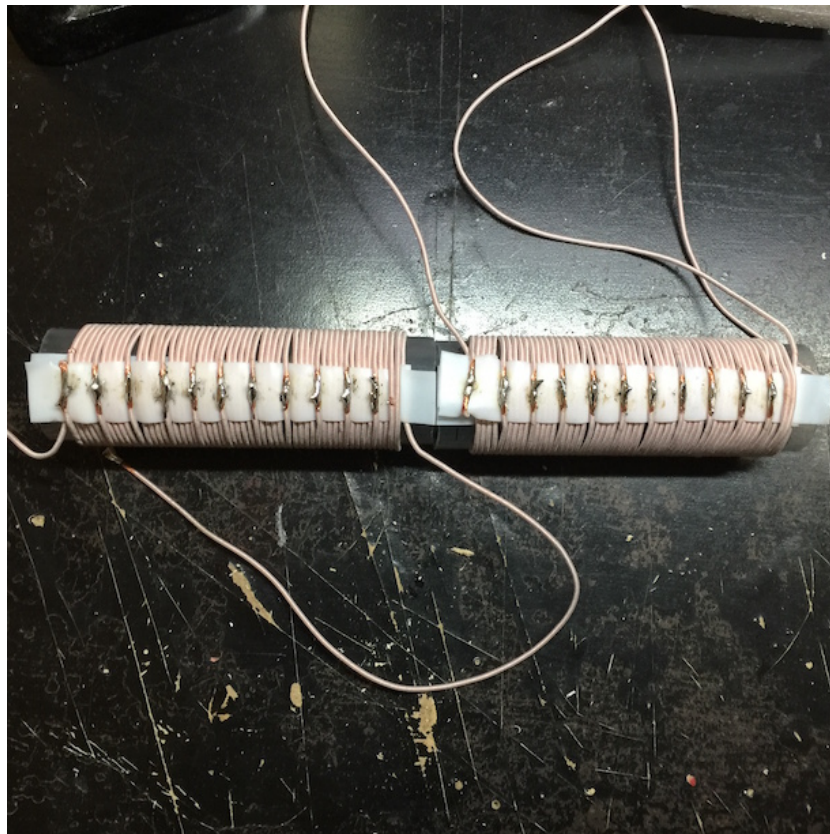


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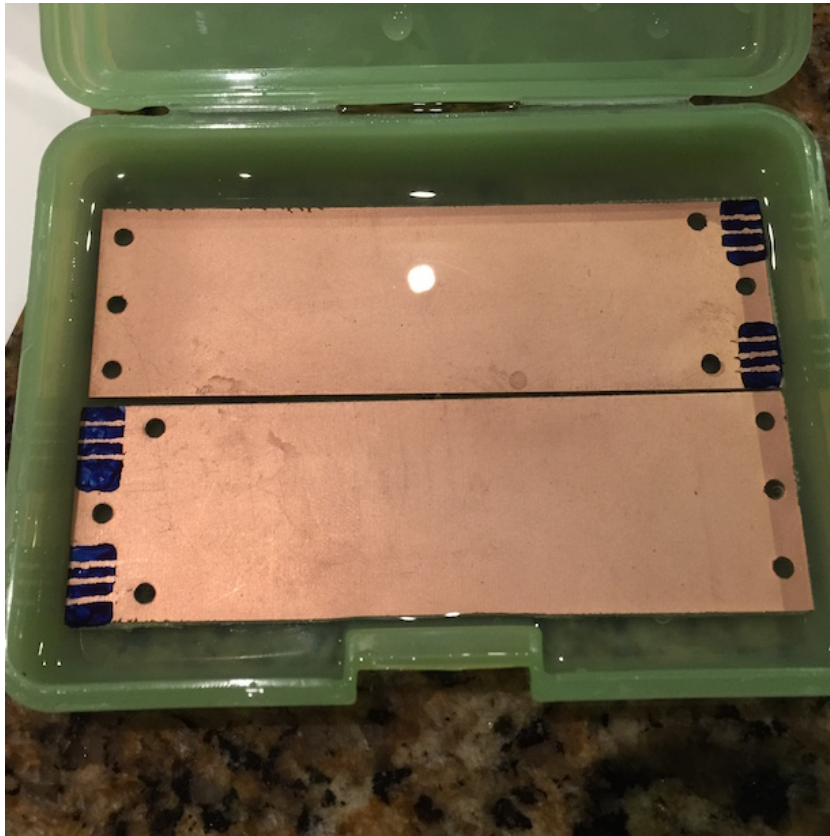
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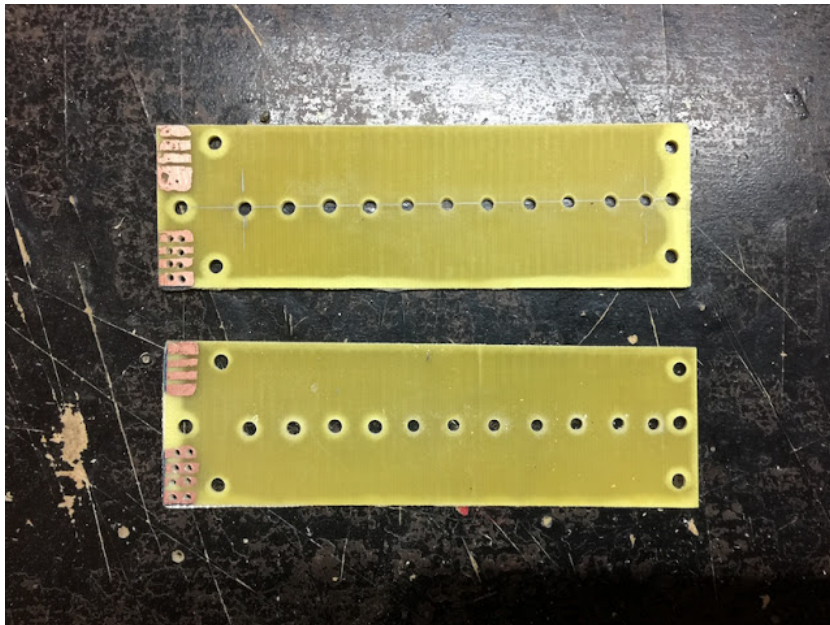
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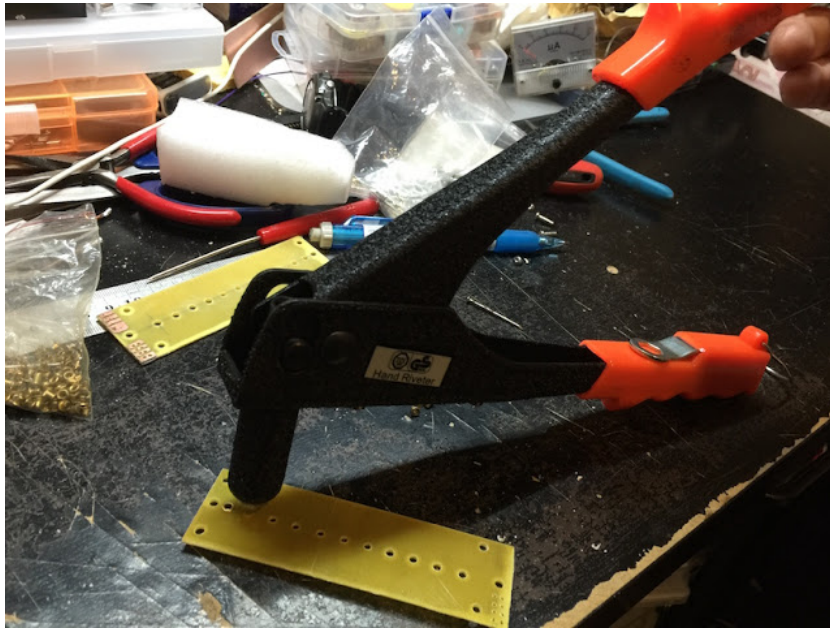
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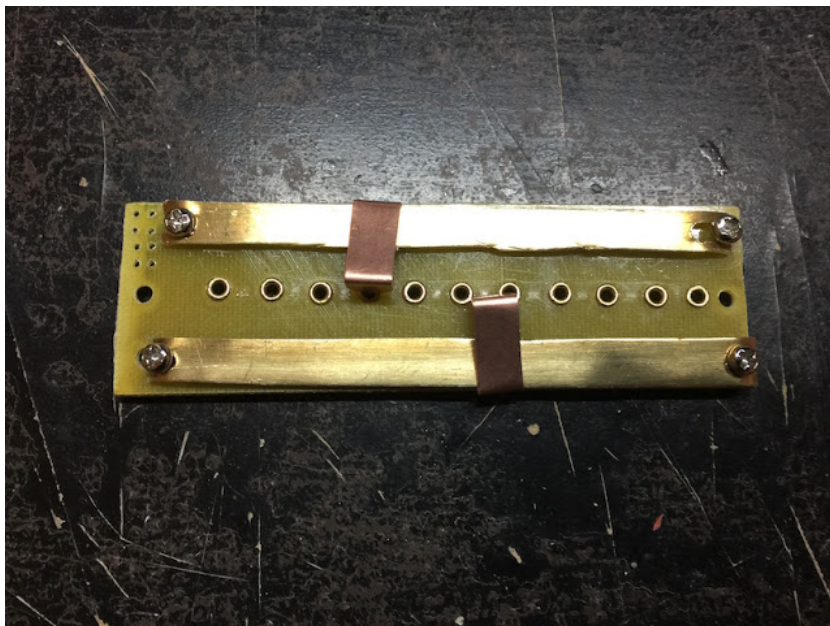
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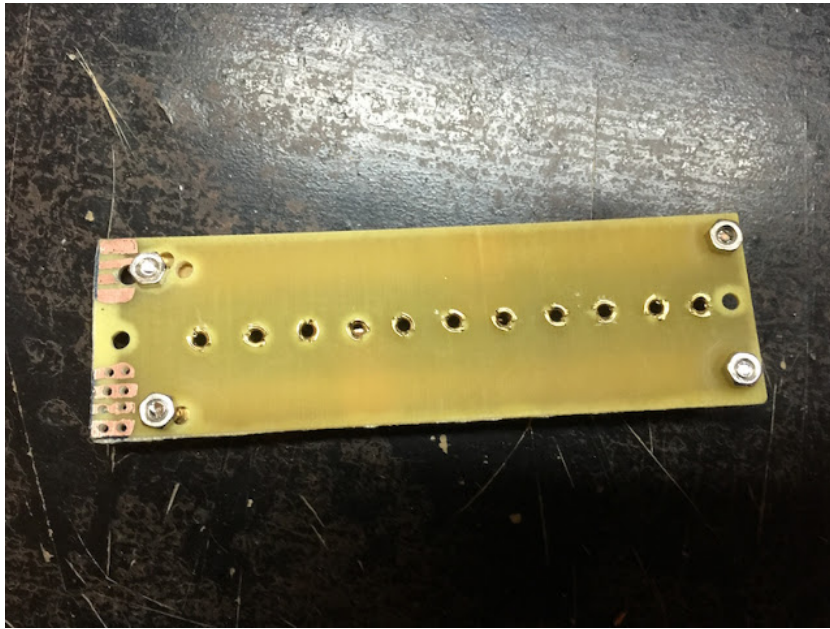
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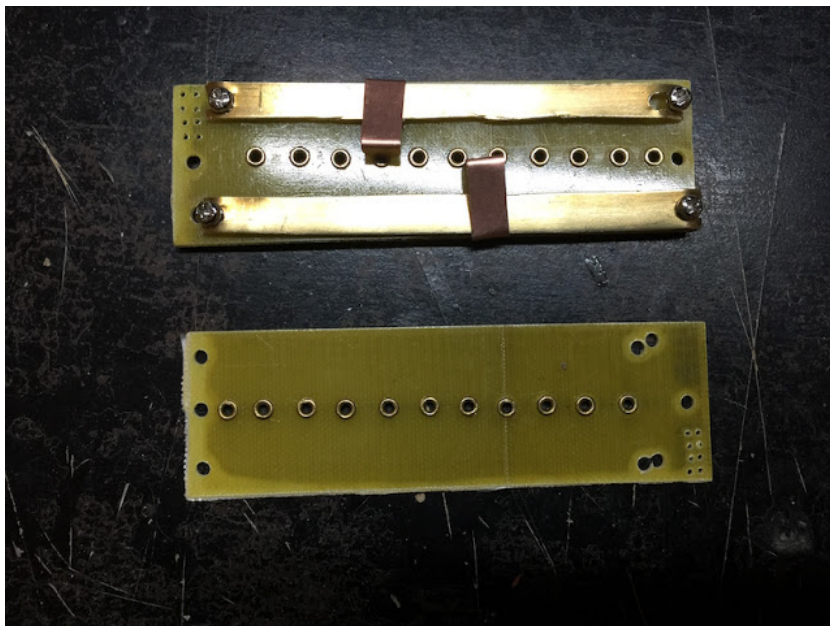
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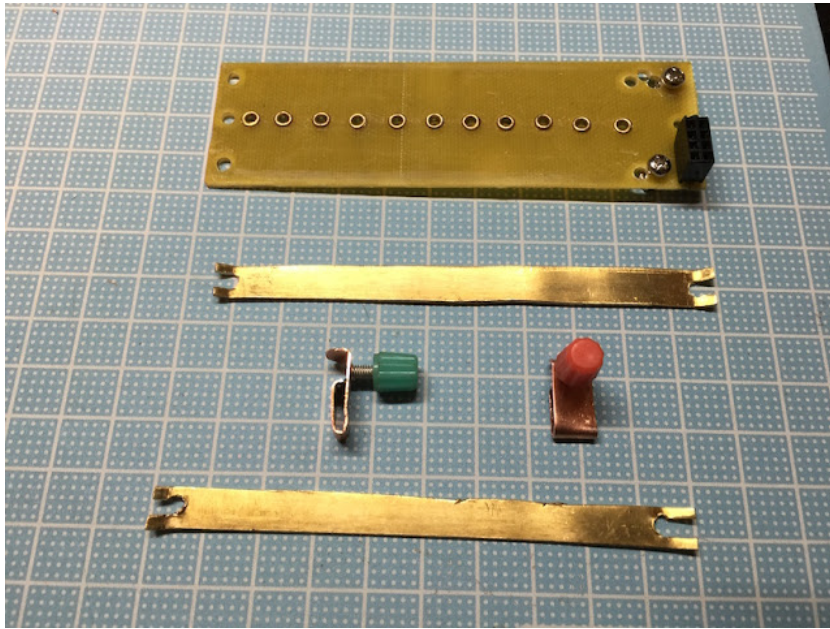
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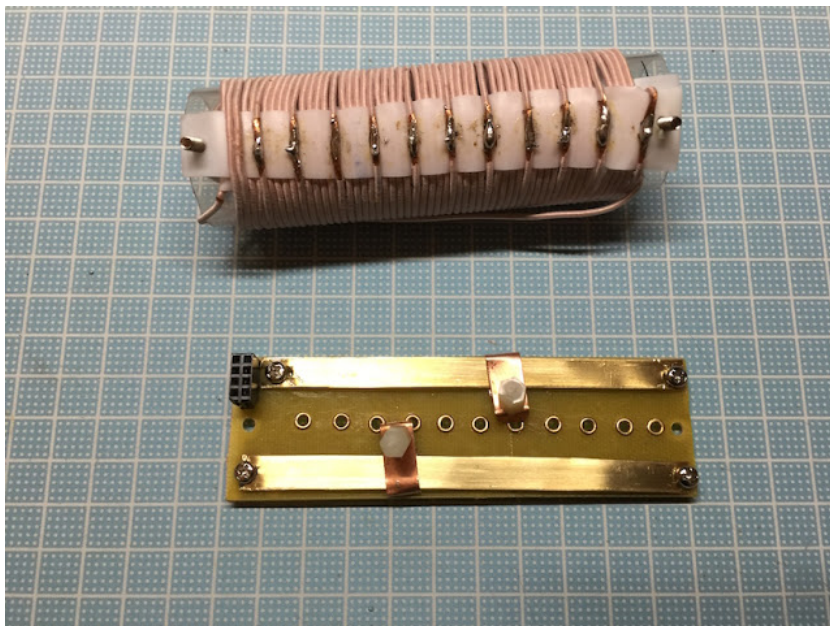
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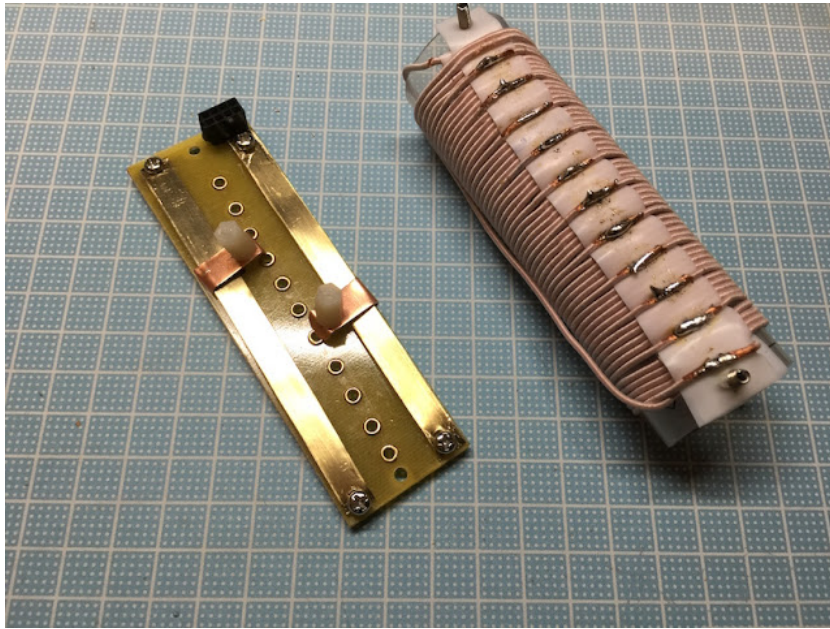
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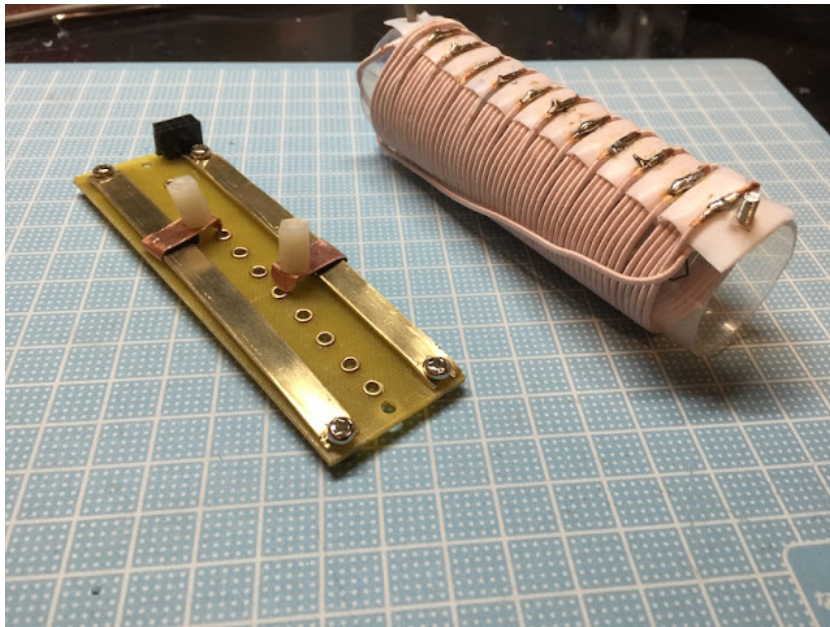
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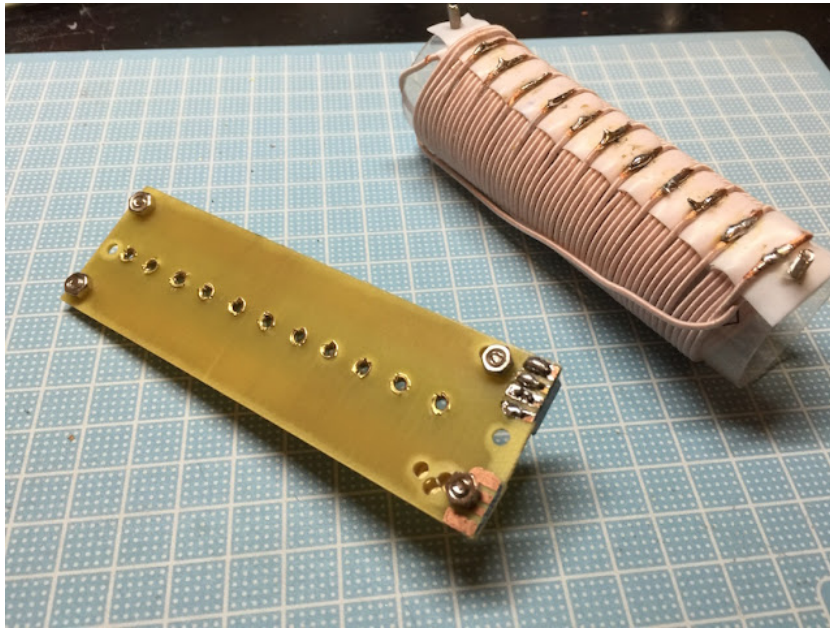
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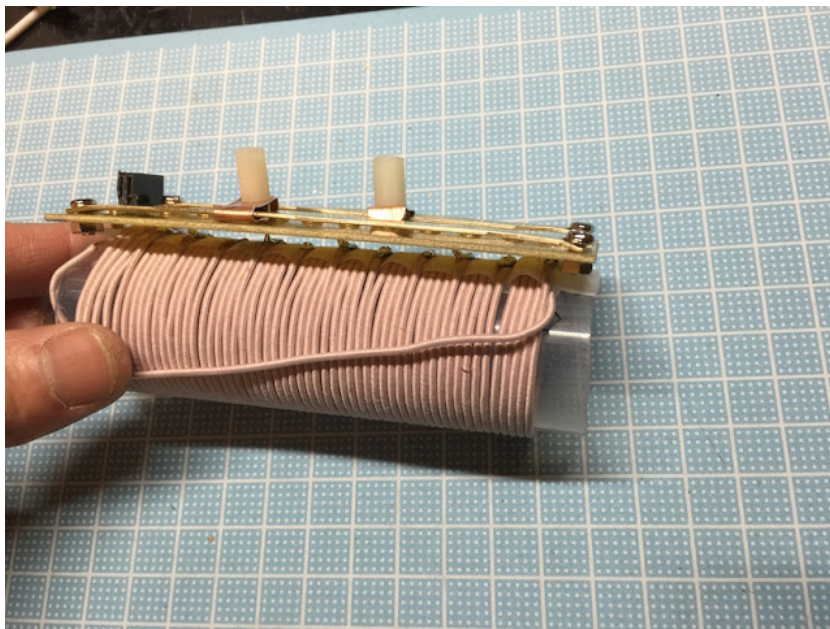
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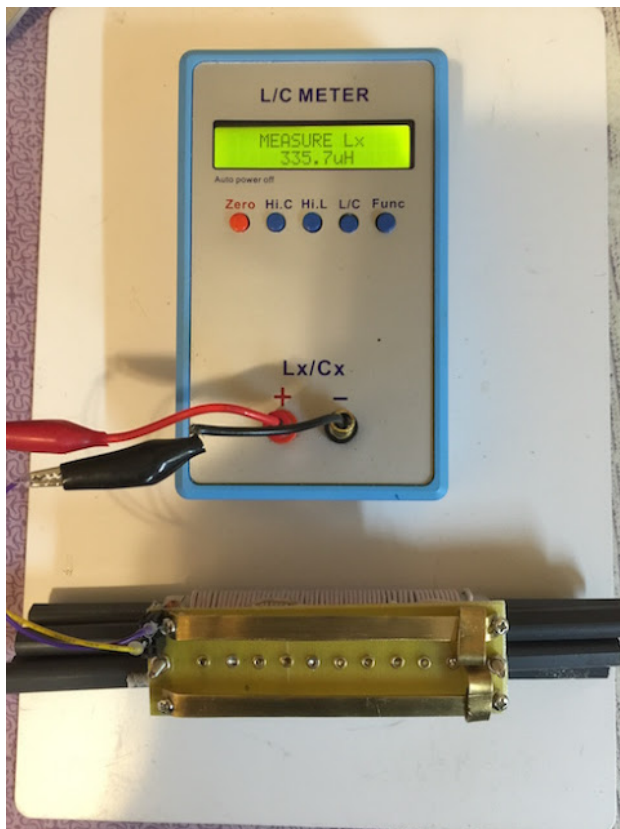
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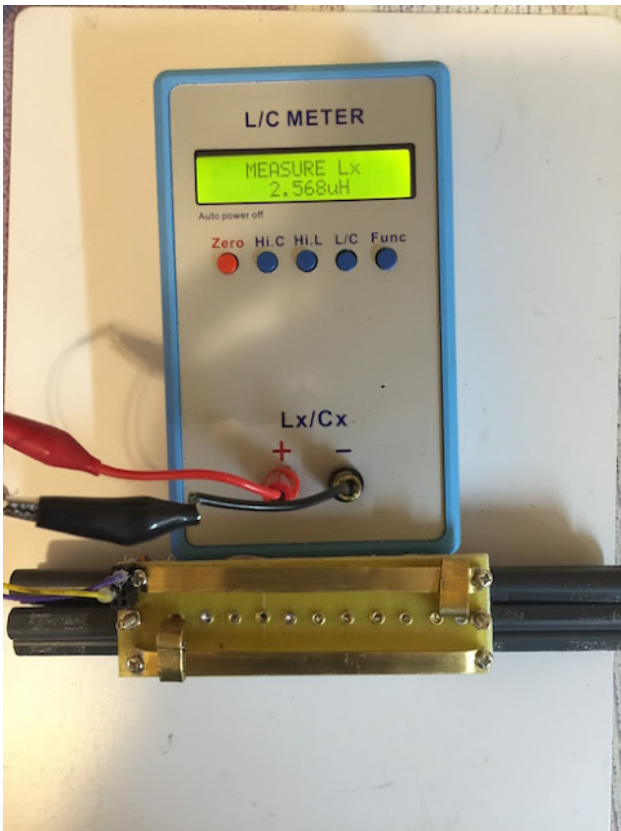
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Posted 11th April 2016 by Billy

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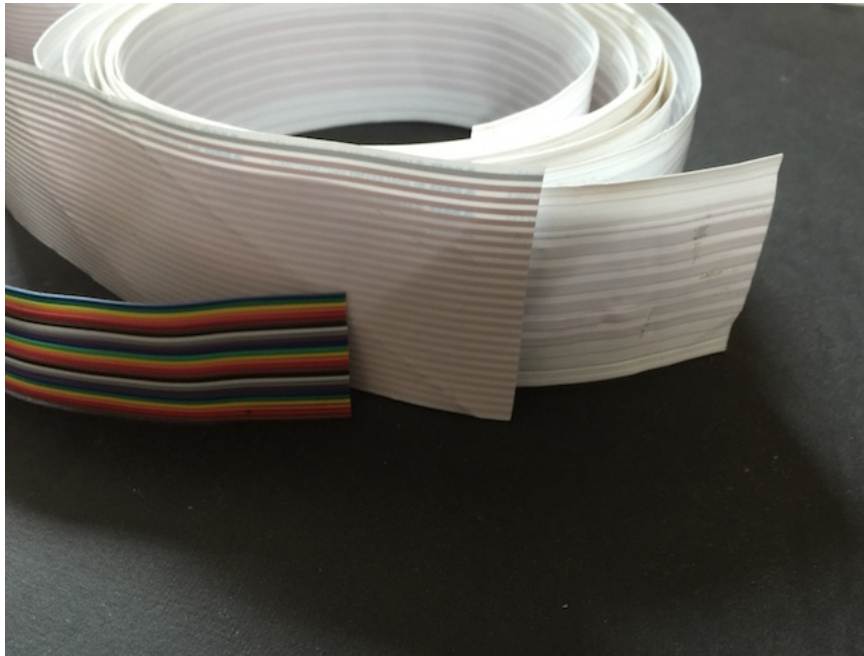


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Posted 8th April 2016 by [Billy](#)

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3rd April 2016 : Loop antenna made from soft flat cable with 3mm copper strips



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I tried to create a loop antenna coil using soft flat cable with 20 x 1mm flat copper strips with good effect before (the one in the middle of the picture).

This time I found find a bigger soft flat cable with 6 x 3mm flat copper strips with a 2mm separation in between (the one on the left of the picture).

You can make a loop solder the copper strips together to make a single coil with 6 turns.

For use with FET (3SK143-Q), 1 turn is reserved for the S-pole of the FET.

Total inductance is 75uH when I mount the laps placed on a square frame made of PVC pipes measured 900 mm on each side.

This matches with 2 x 500pf variable capacity connecting in parallel making a 1000 pf Variable capacitor.

Result is quite good, though still not comparable with a coil made from 0.04x660 Litz wires of the same size.

However, this one is easy to make and quite portable. You can just roll them up and carry them anywhere.

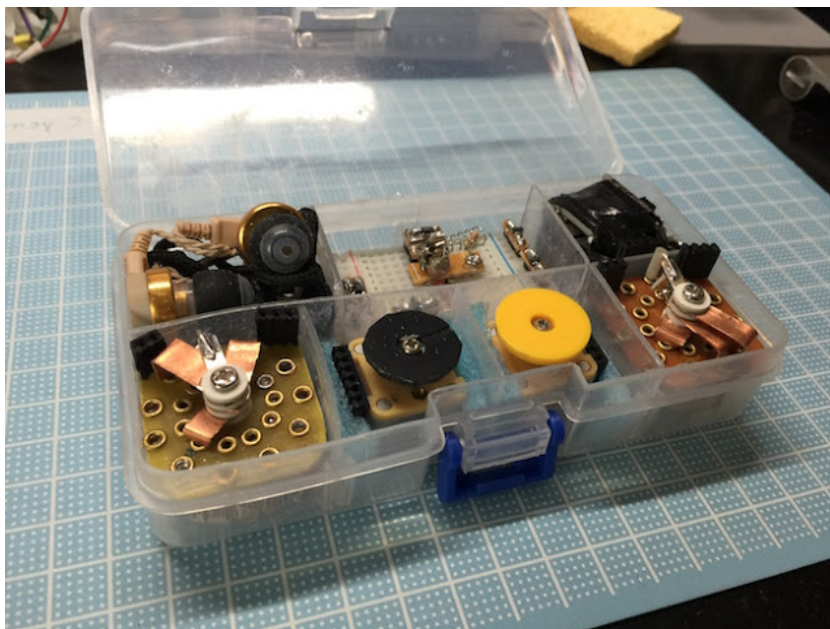
Find some sticks to create a frame and mount it on top. Or hang it from a tree when picnicking.

Posted 3rd April 2016 by [Billy](#)

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2nd April 2016 DIY Tiny portable crystal radio laboratory 135 x 70 x 30 mm

Here are the pictures:



Inspired by

skywave's traveling crystal set. I built this DIY Tiny (135 x 70 x 30 mm in size.) portable crystal radio laboratory.

I found a tiny sorting box made of low loss material (pp) and start to put things in:

- a couple of the DIY tiny multi-pole rotary switches (that I built) soldered in with the ferrite coils. I used 31mm ferrite core with 100u permeability and Litz wire of 0.04 mm x 60 threads (see the picture below for the no. of turns). The shortest handle of the rotary switch selects the number of turns of the antenna coil. The longest handle selects the tapping point of the detector in the tank coil. The one in the middle selects the number of turns of the tank coil to match with the tuning capacitor

- a couple of 2x270pf plastic variable capacitor.

- a pair of 150 ohm hearing aid ear buds (total 300 ohm).

- a tiny 200K to 300 ohm audio transformer that I purchased from taboo.com soldered in with switches for the different way to connect , e.g. 200k to 300 ohm for my hearing aid ear buds, or just connect 200K in parallel with my piezoelectric ear bud.

The transform can be improved as its not ideal to have impedance fixed at 200k. I am trying to open it up to see if I can add additional taps without breaking the hair thin wires inside.

- A breadboard with the following different types of detectors

- Crystal

- BAT85

- 1N60

- 1N34A

- 1SS86 x 2

- HSM 2820 x 2

- HSM 2850 x 2

- 3SK143-Q (*3DQ) x 2

- 33K resistor to work with 3DQ.

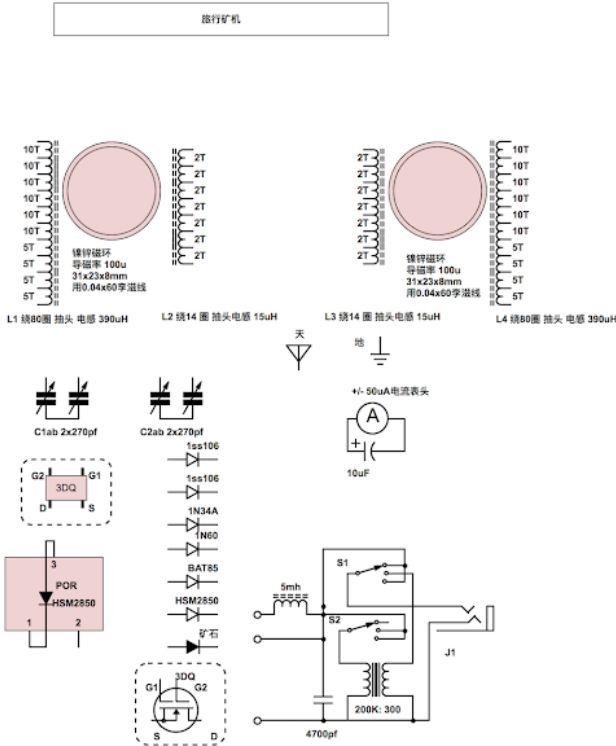
- Connecting wires (hidden under the breadboard).

- Tiny 50uA DC current meter (still trying to find one. So far I can only find a tiny 500uA meter that does not move much as the crystal radio current is so small). If I ever find one, it'll take the place currently used by the earbud.

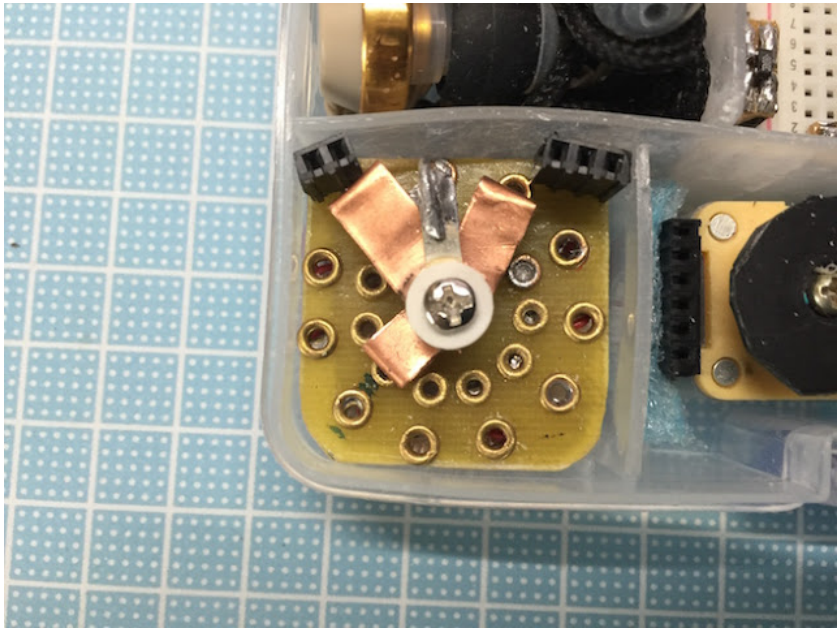
I tried this in the hotel room when traveling and got good results.

- Tested using my 700mm umbrella loop antenna.

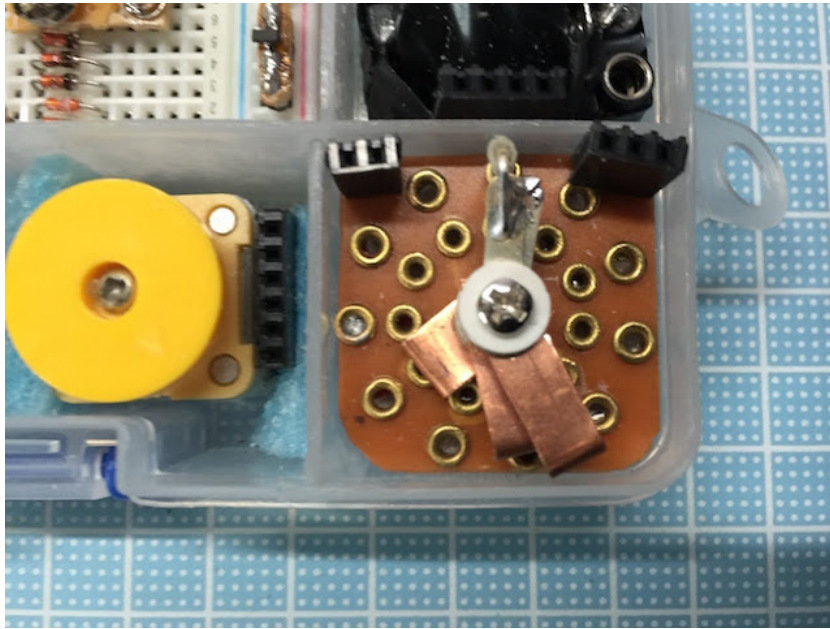
- Tested by hanging 3 meters of horizontal wire at the top of the curtain inside the room. https://4.bp.blogspot.com/-Uq_TZea4wT4/VwBnupV99NI/AAAAAAAAACeQ/OMB8y1i7TUsNOj0Eox2Ag9o-DGAV79HJw/s1600/IMG_6921.JPG



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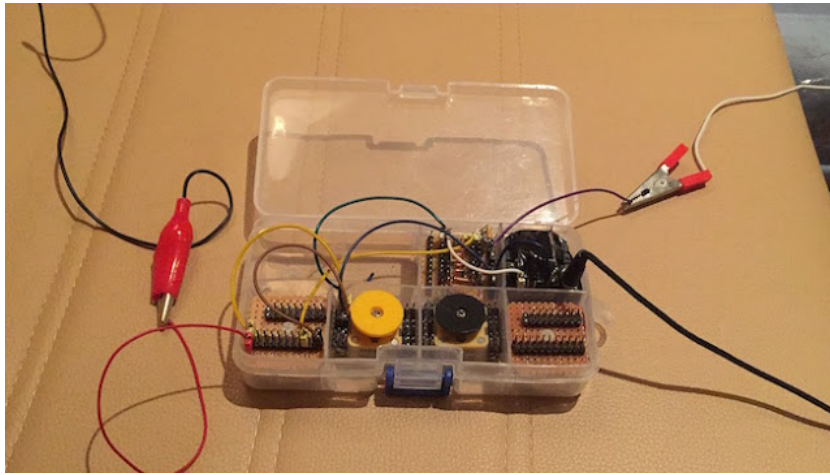
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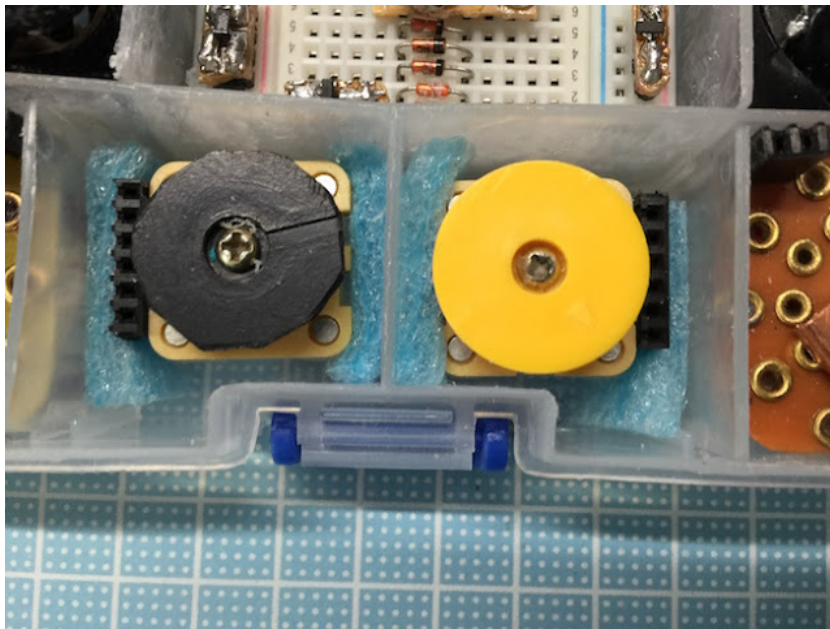
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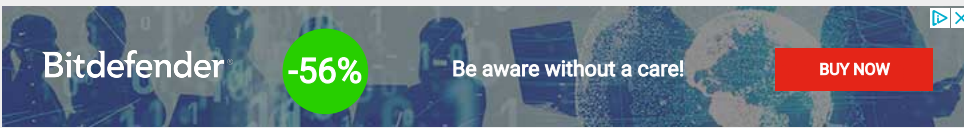
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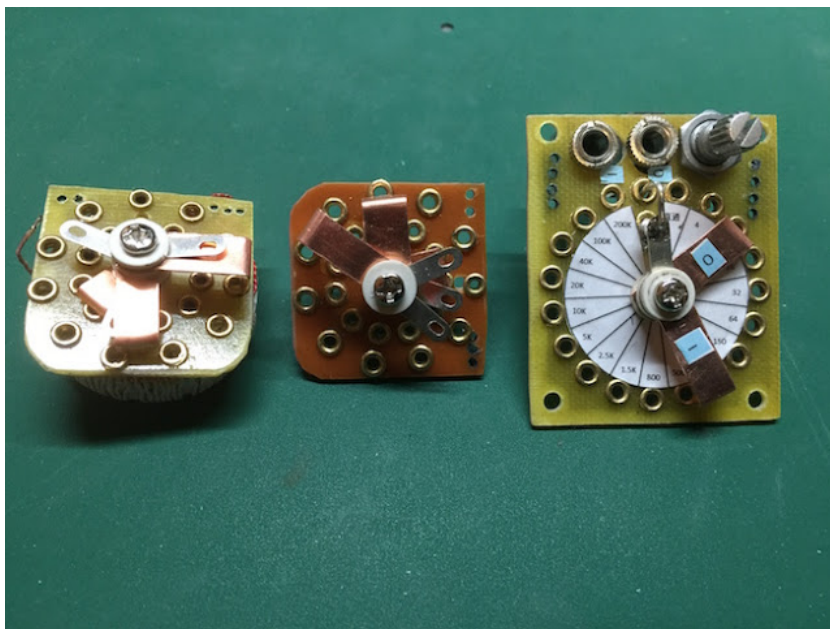
  

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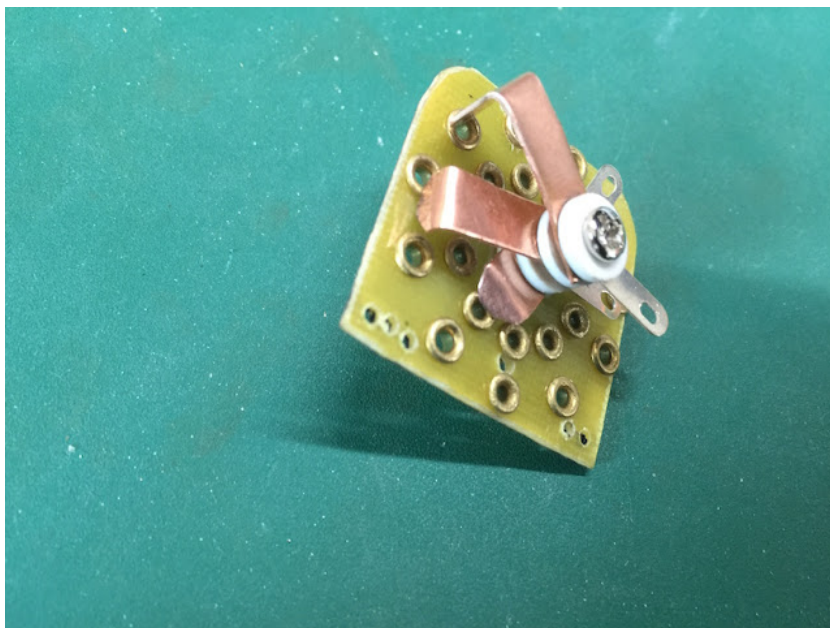
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22nd March 2016 DIY dual pole 18 position switch for KPB-02 Impedance matching transformer

I DIY a dual pole 18 position switch for KPB-02 Impedance matching transformer and another dual pole 10 position switch for tapping a ferrite toroid coil.



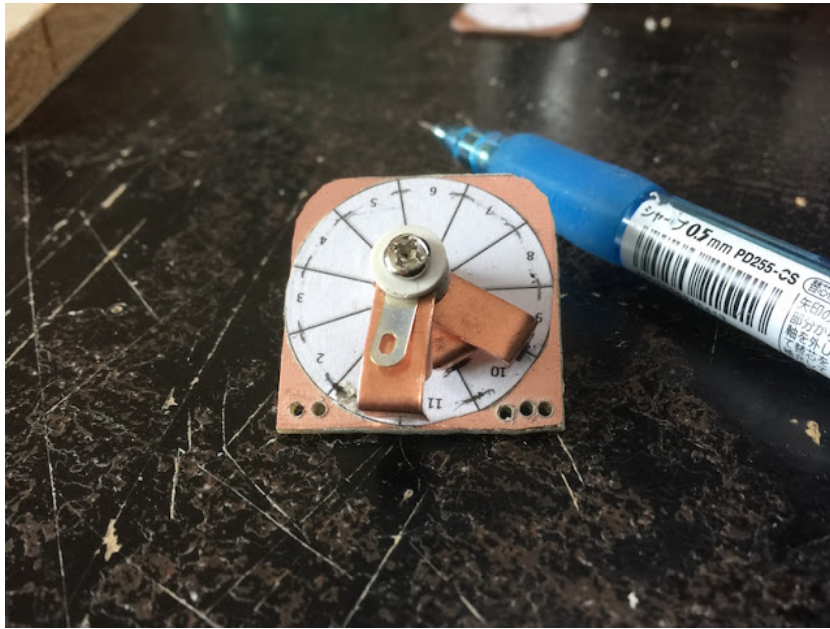
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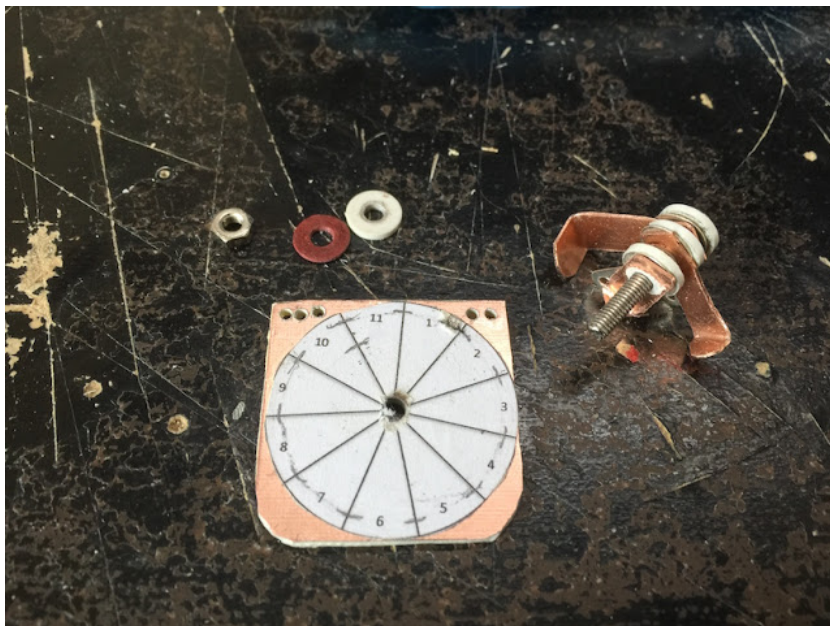
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I added another 3 pole 10 position switch for tapping the ferrite toroid coil.
 1st pole for the tap on the antenna coil.
 2nd pole for the tap on the tank coil for the variable capacitor for tuning.
 3rd pole for the tap on the tank coil for the detector (divide).

Here are the pictures.



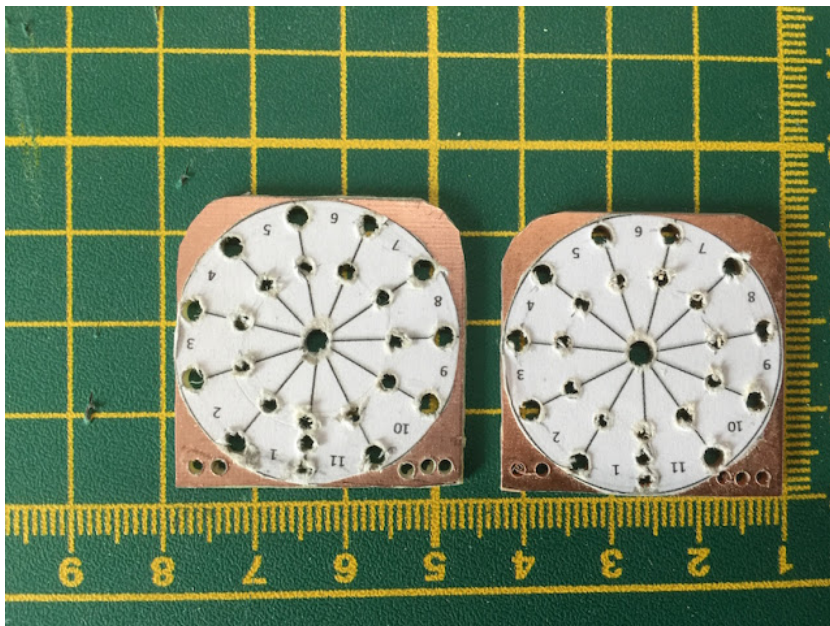
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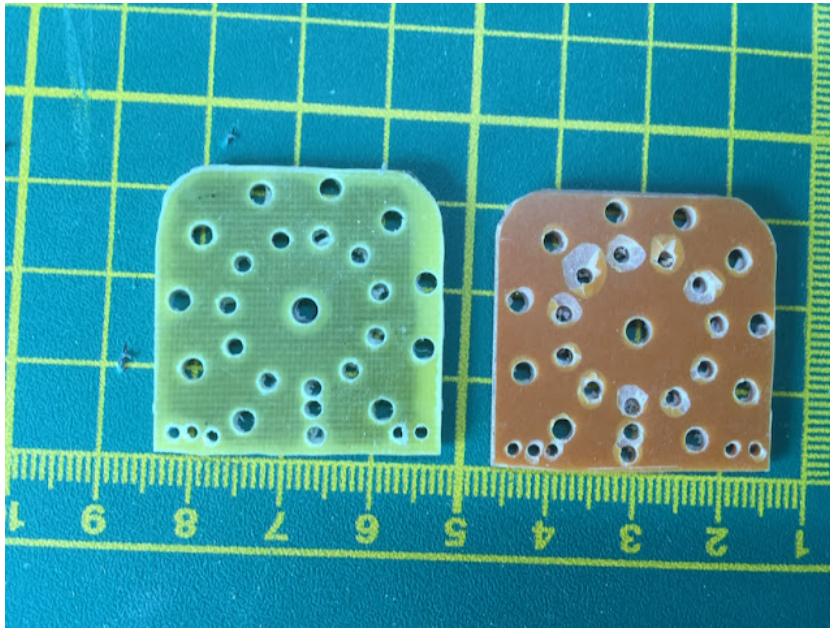
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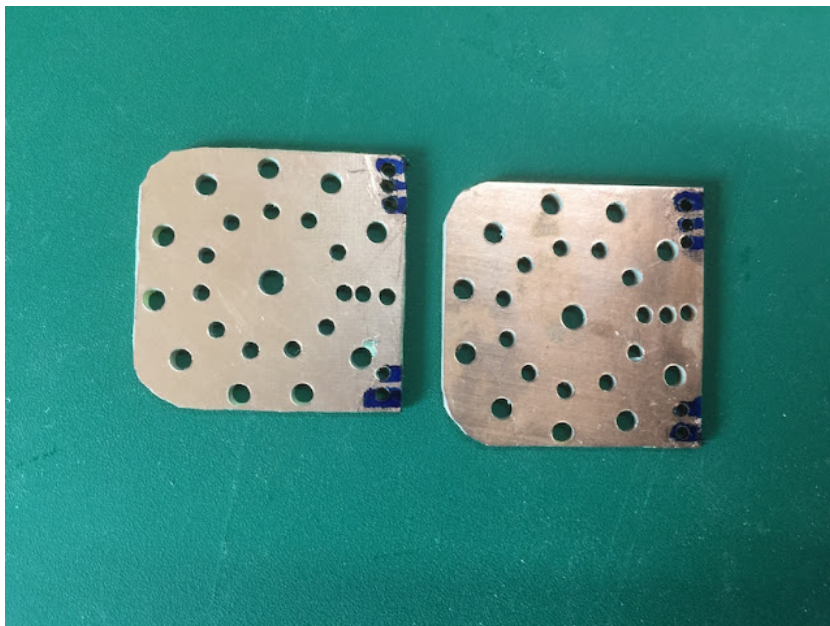
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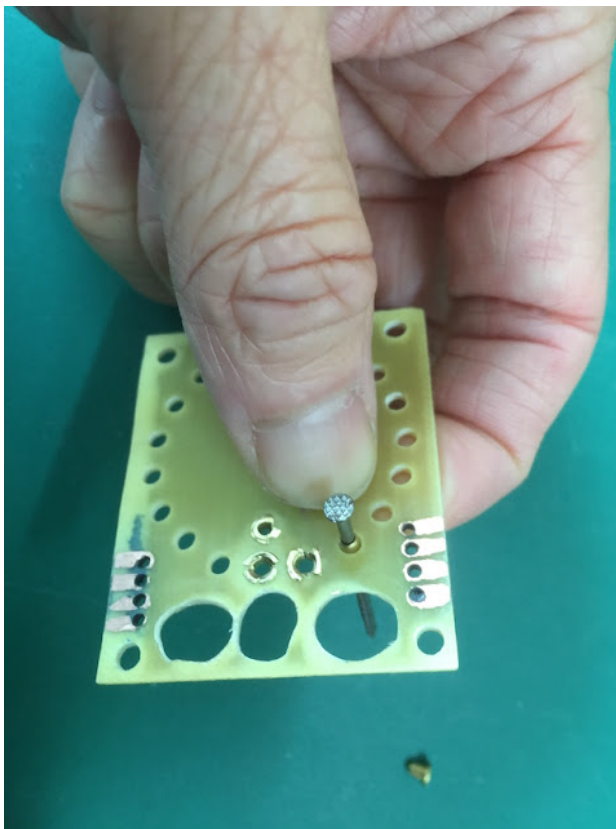
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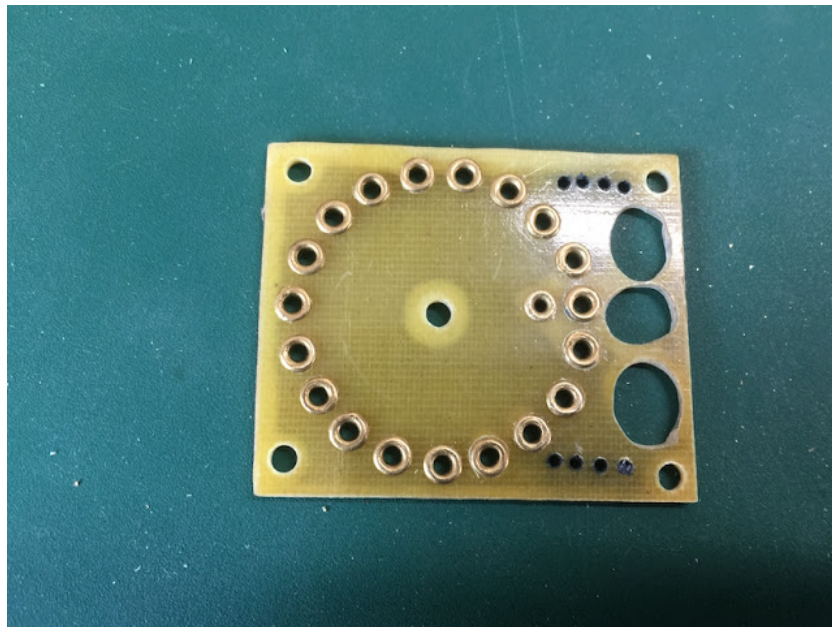
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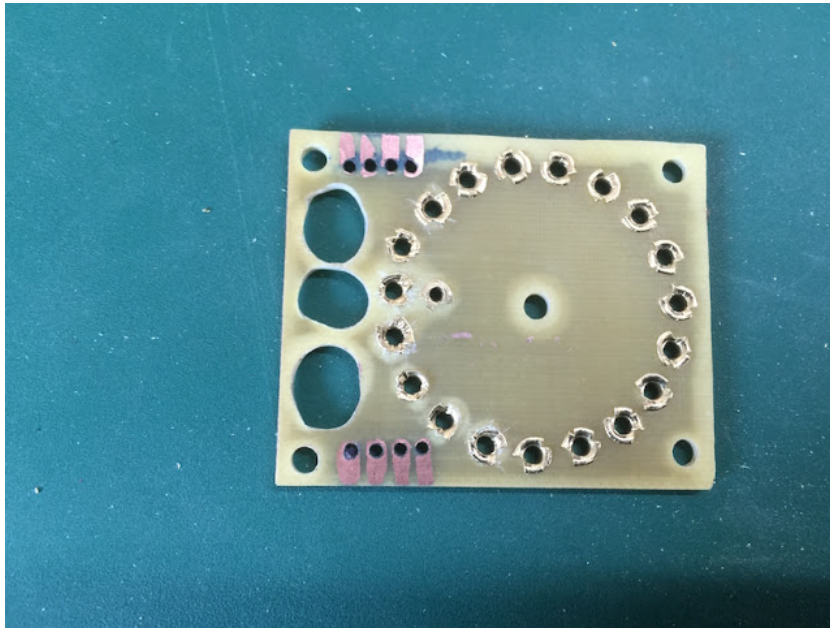
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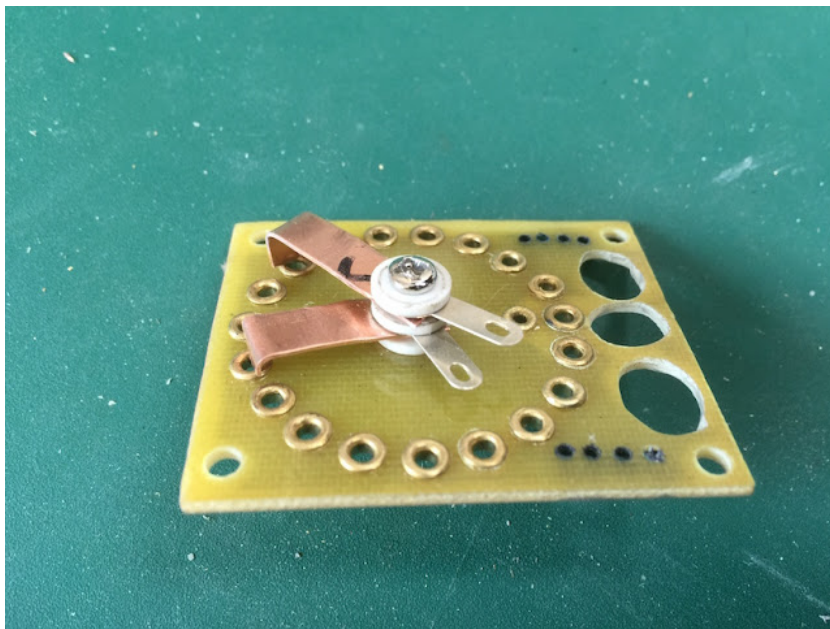
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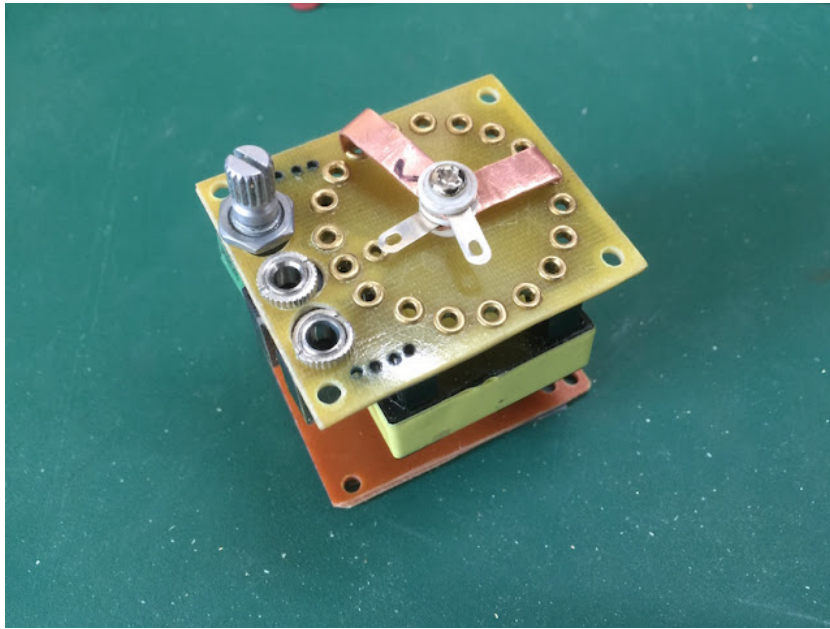
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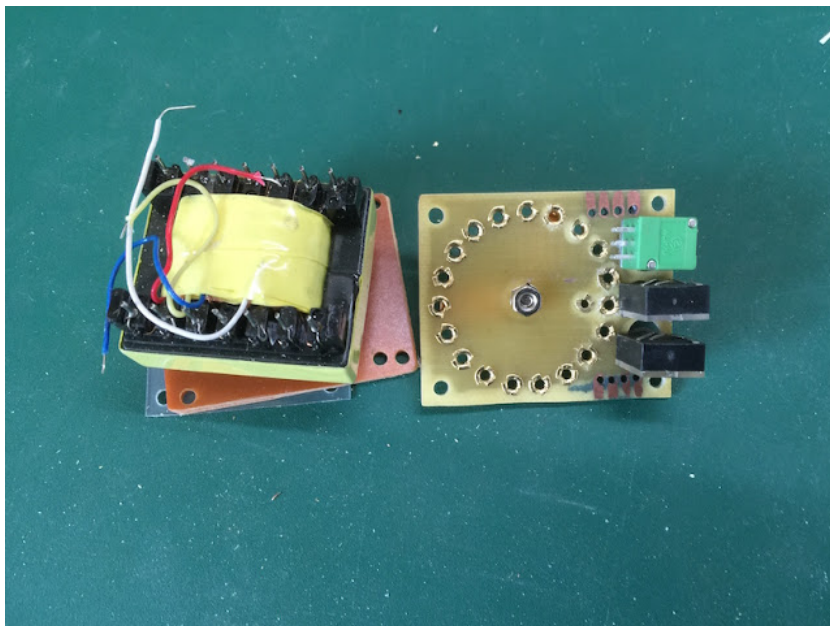
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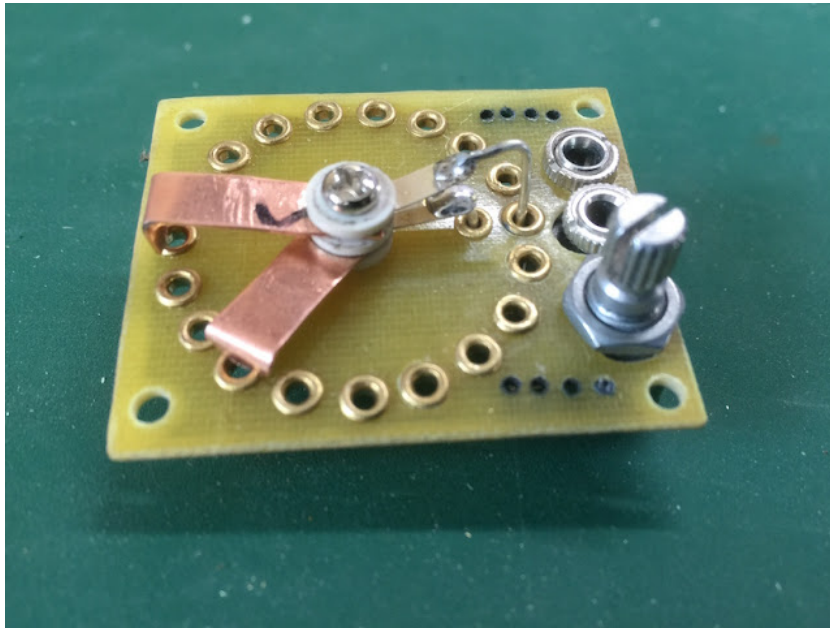
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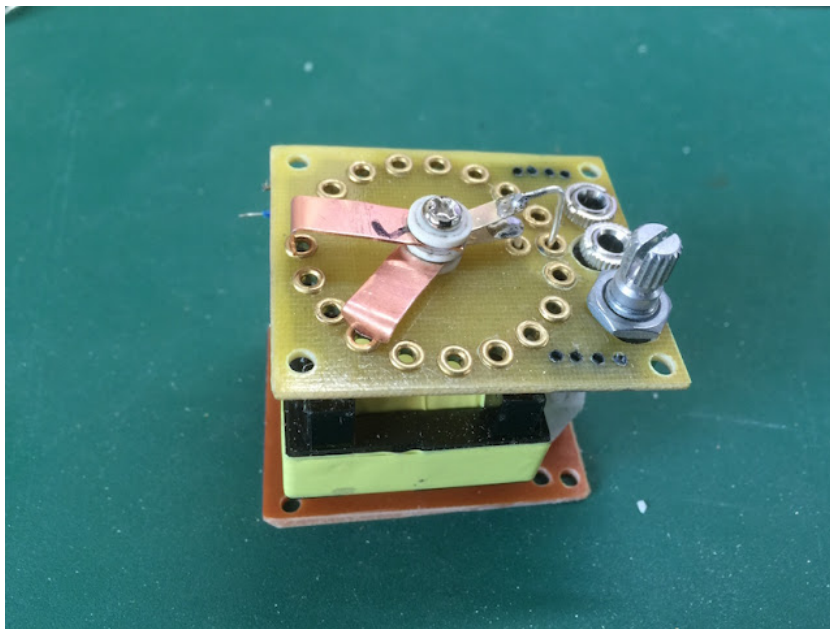
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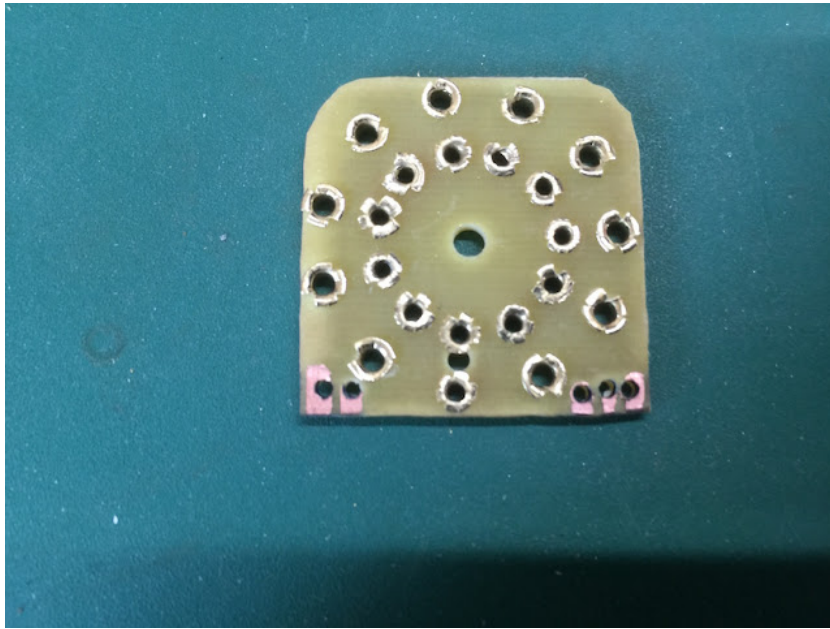
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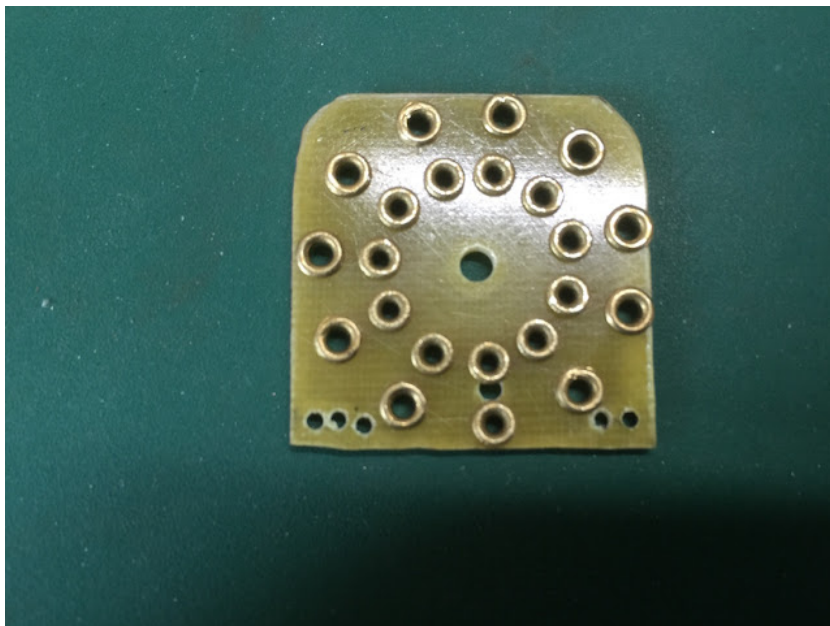
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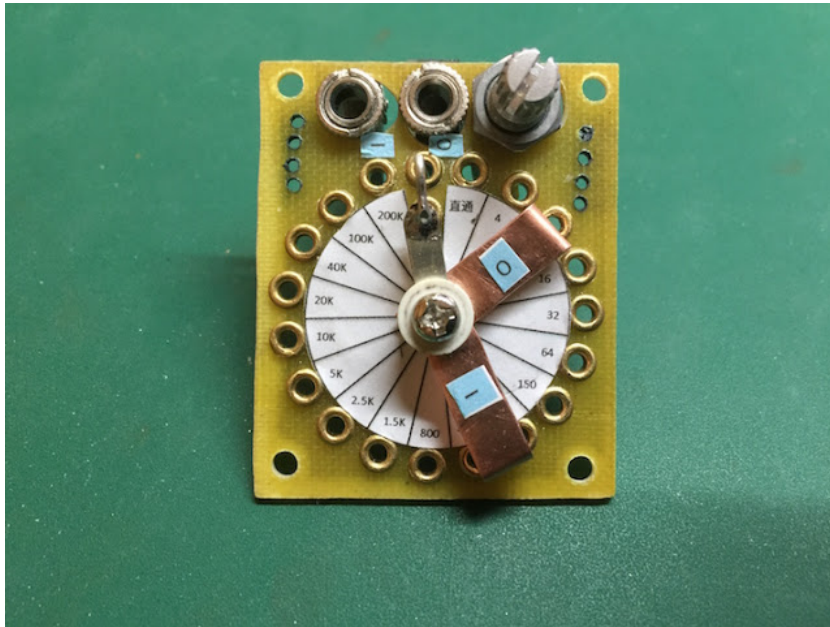
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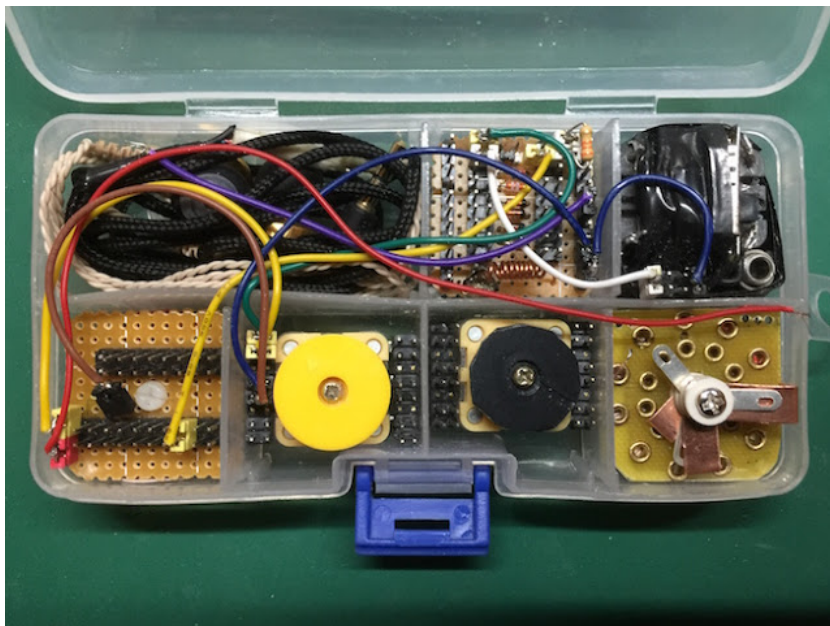
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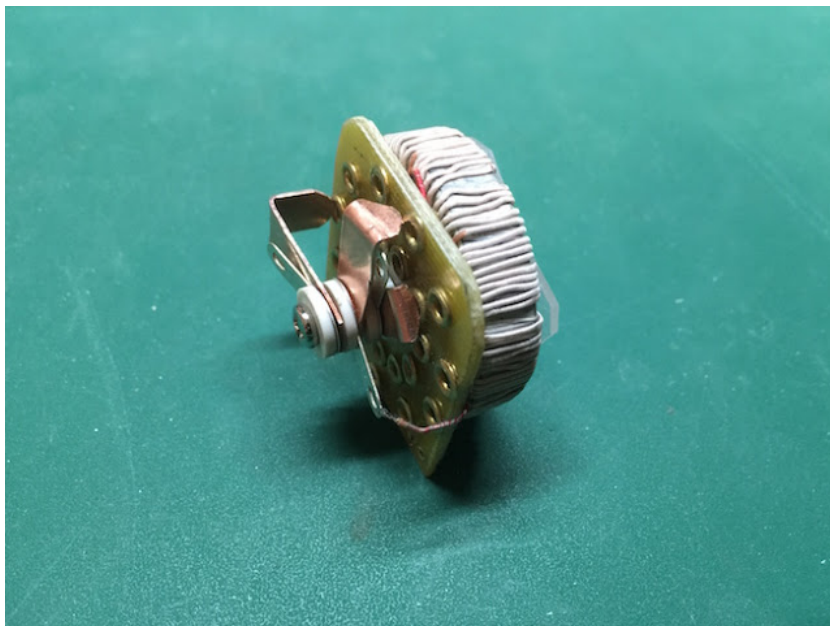
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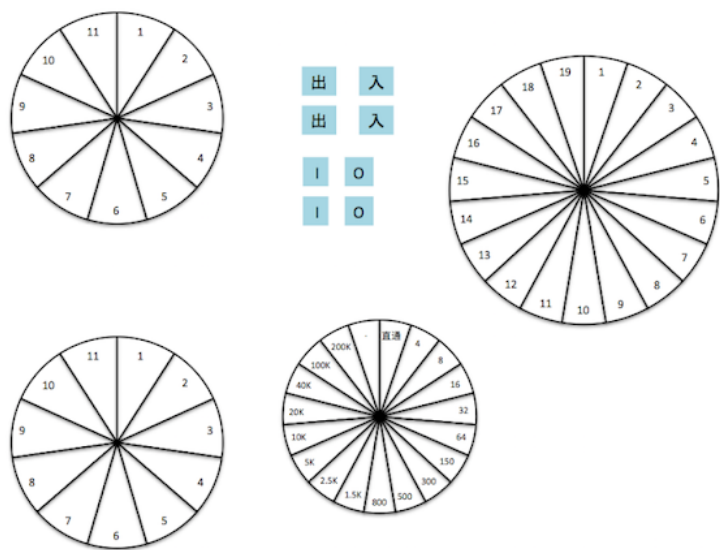
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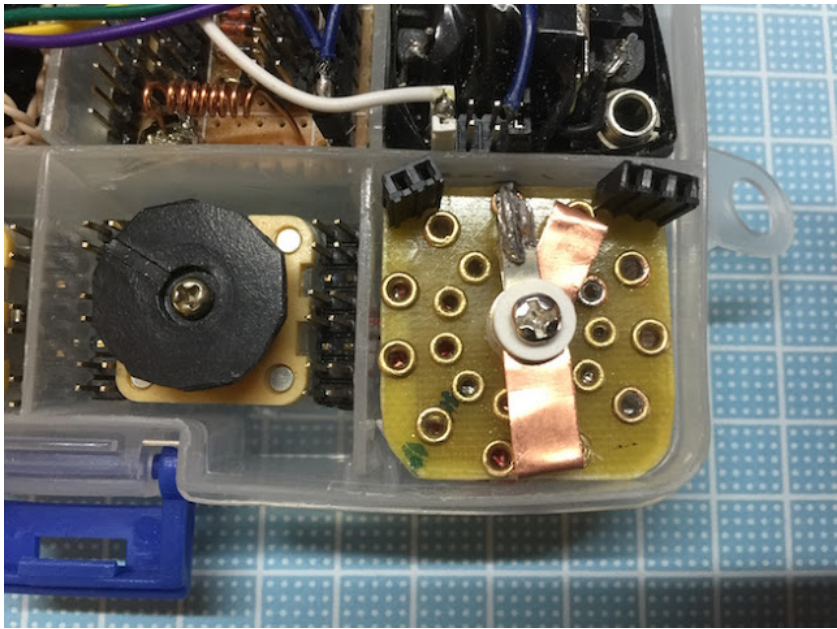
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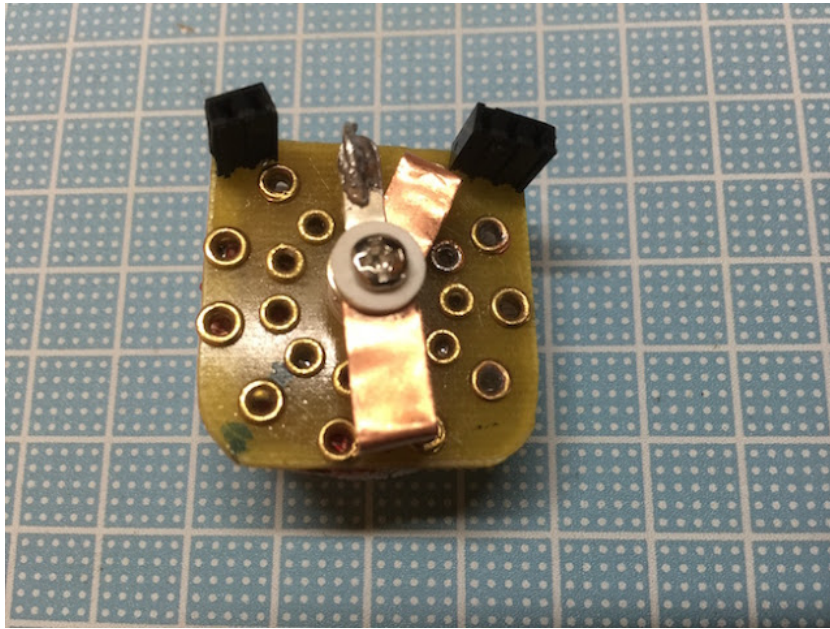
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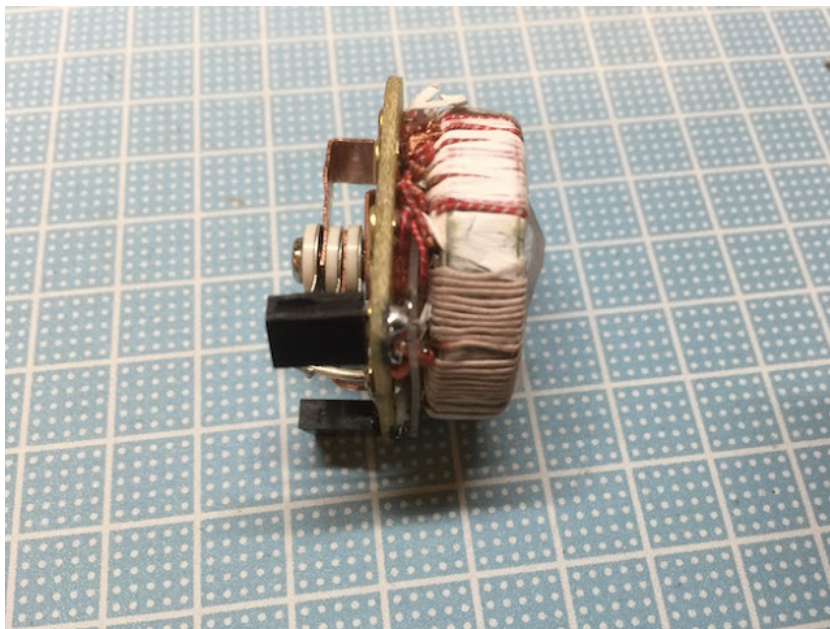
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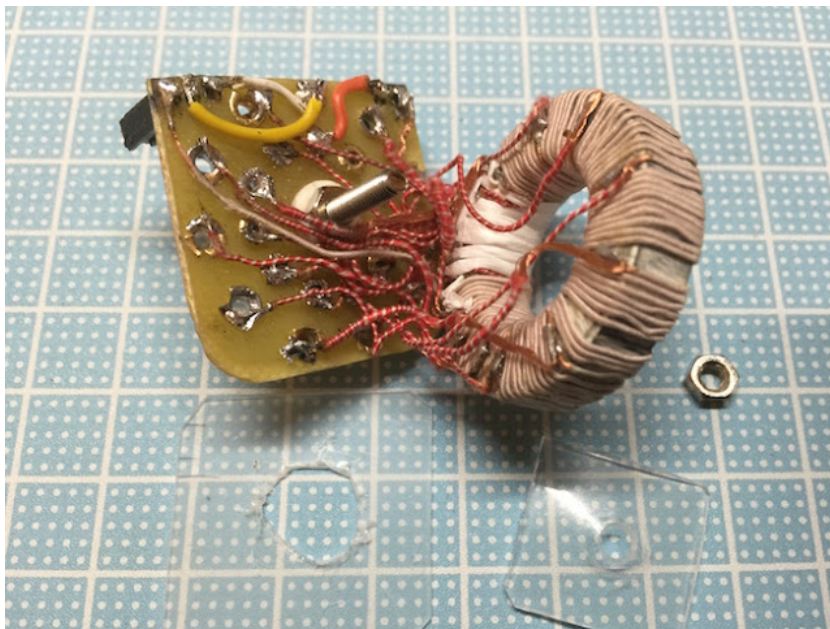
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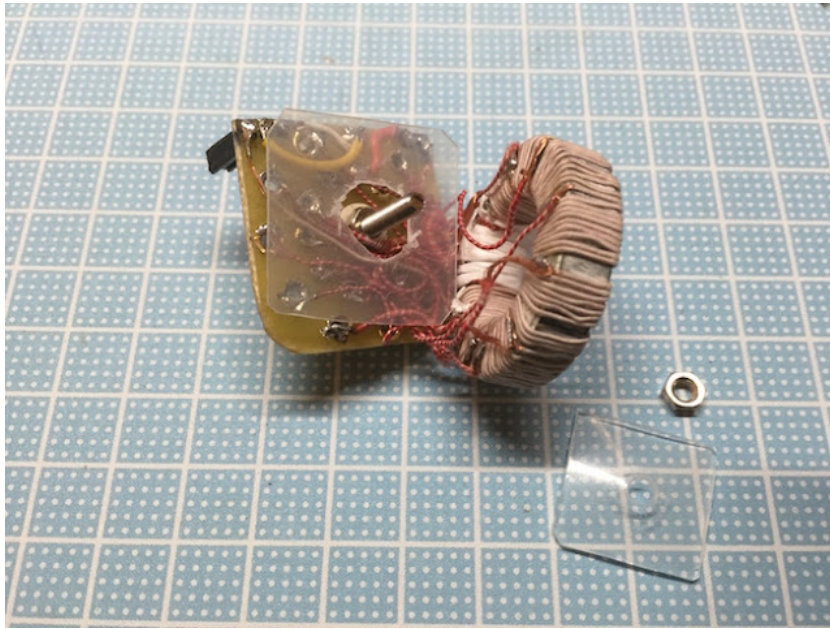
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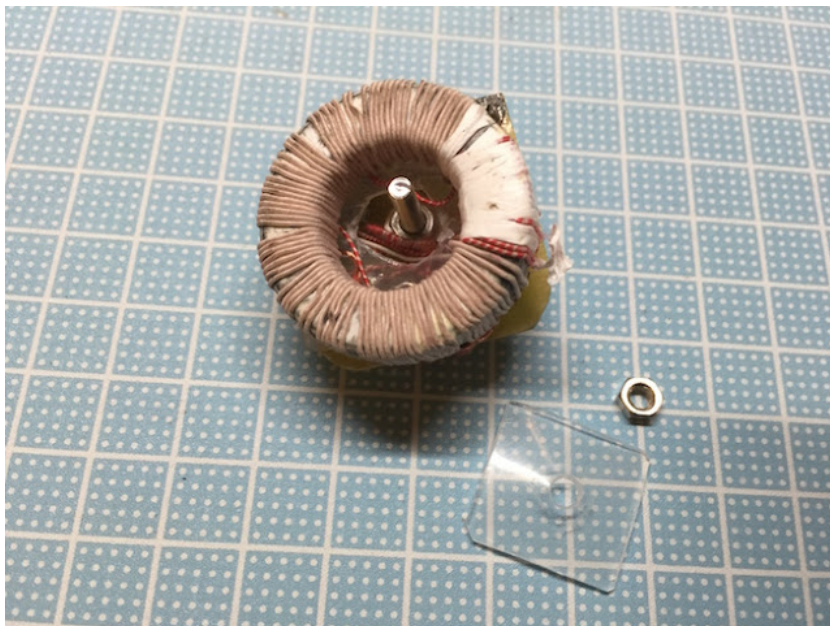
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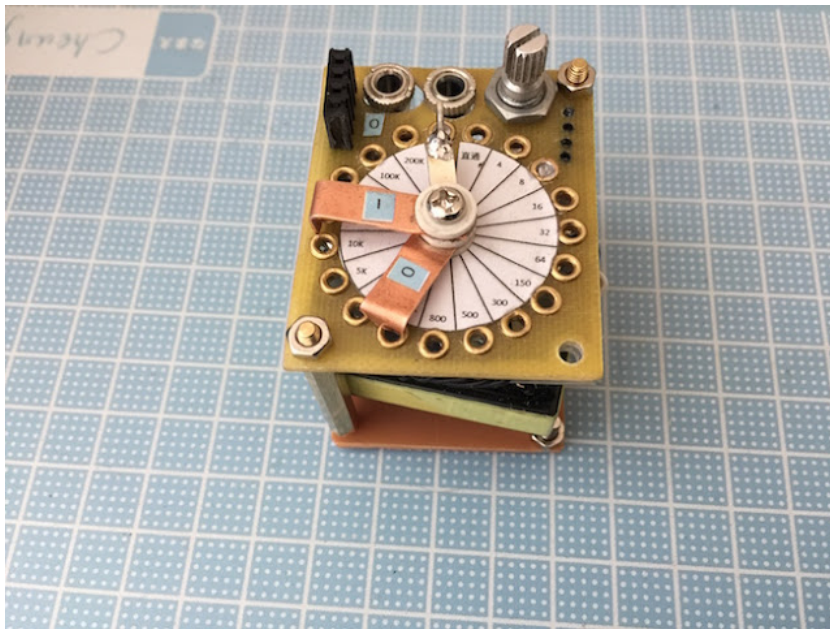
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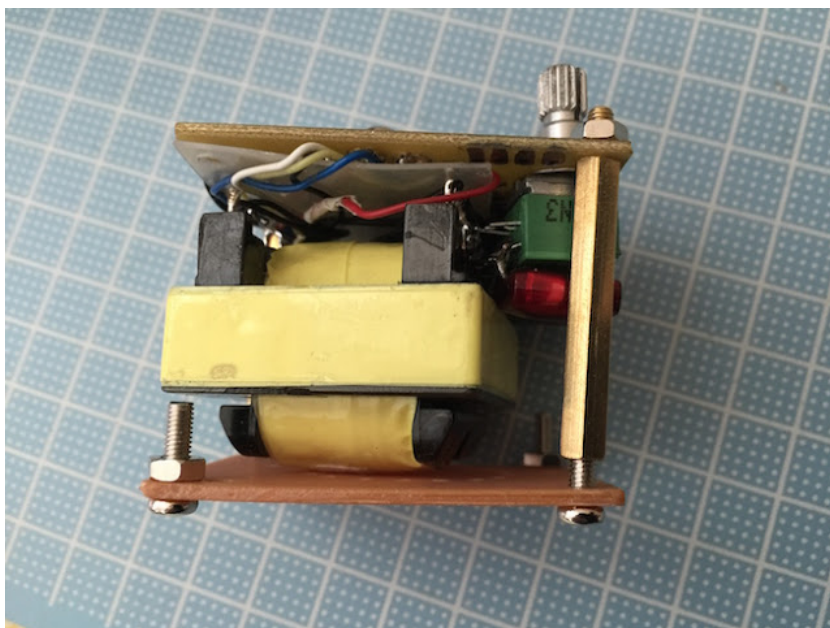
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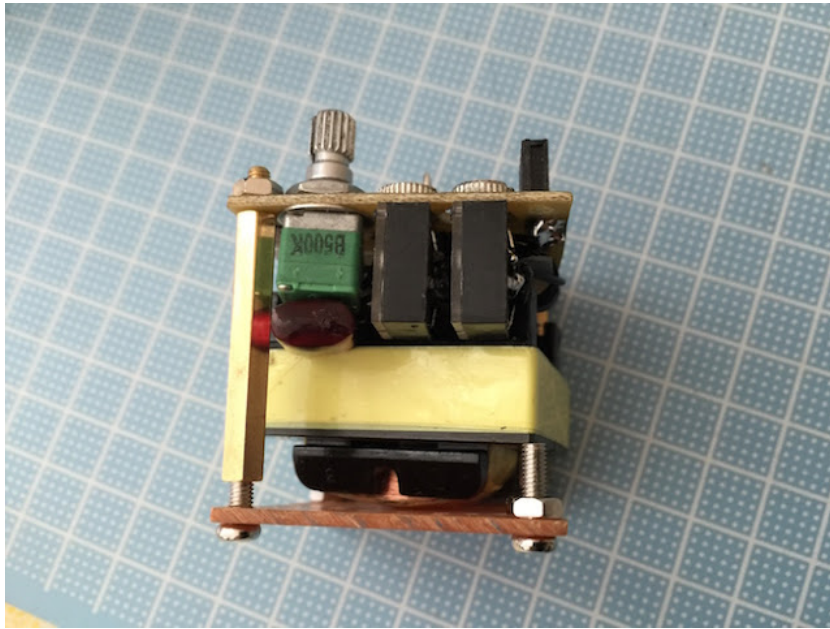
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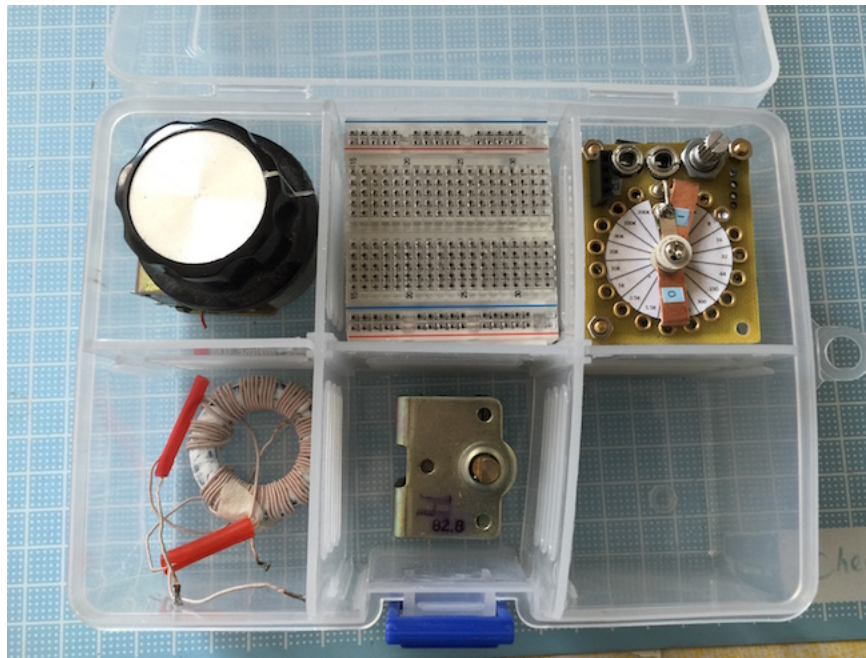
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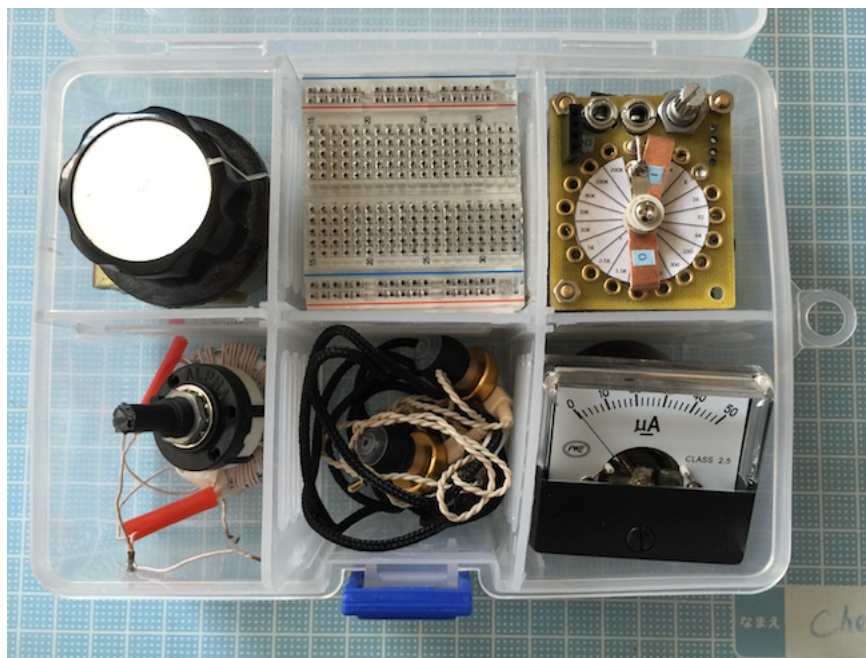
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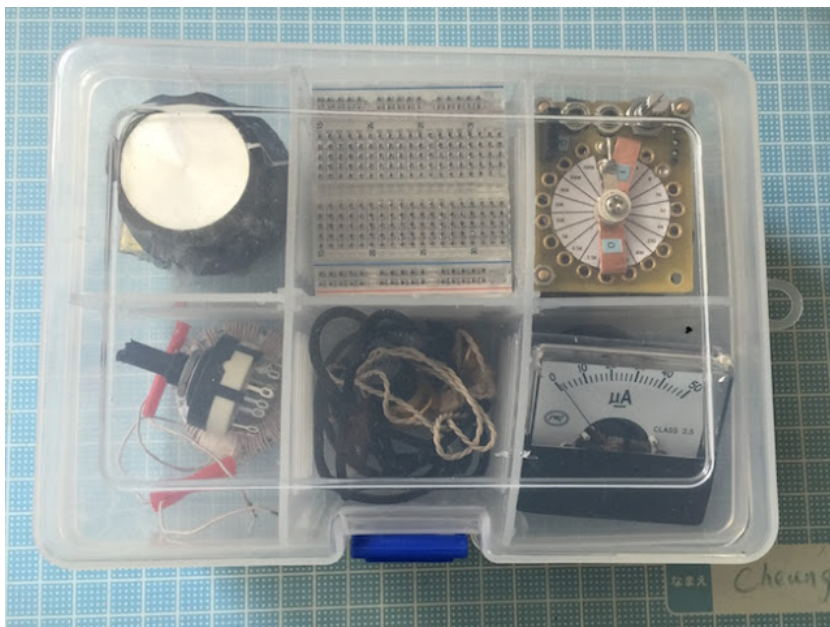
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Posted 22nd March 2016 by Billy

0 Add a comment

17th March 2016

Vietnam Crystal Radio Test

I traveled to Vietnam, Ho Chi Minh City on the week of Mar 14 2016.

My hotel room is on 2/f, 3.5km from the broadcasting station for the voice of Vietnam (local state owned MW radio station). Since the window is sealed, I have to rely on my umbrella loop antenna (0.8 meter diameter). I measured a dc current of 65uA from my Crystal set, so loud that I can plug in an 8 ohm headphone and still got reasonable loudness.

I also ran a series of tests using my tiny mobile crystal radio laboratory.

I brought my FM Crystal Set with the 1.2m extensible antenna too.

I could receive one station but weak and barely understood the broadcast.

Wearing my jacket crystal radio with a 400mm x 600mm loop antenna sewed into the back of the jacket, i could listen to the radios from within a bus traveling on the street using a 35K143-Q crystal radio. You can see that at the end of my video.

I also visited the museum and saw some radio communication equipment used during the wars.

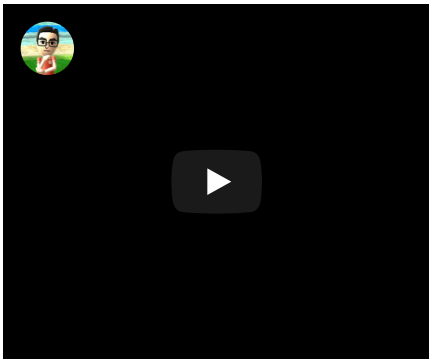
Purchased some nice wooden boxes that can be used to build some nice crystal sets. only USD 3.5 each.

I noticed that there are lots of antenna towers in Ho Chi Minh City. May be because the buildings are not tall enough, towers are needed to pull up the antenna to the right height. I guess most of these are for 3G mobile phone communication. I did see one super tall antenna that seems to match with my info about the location of the Radio transmission stations for the AM and FM radios.

Here are some pictures.

And the video of my crystal radio tests.

<https://youtu.be/LVl63edu83Y> [<https://youtu.be/LVl63edu83Y>]



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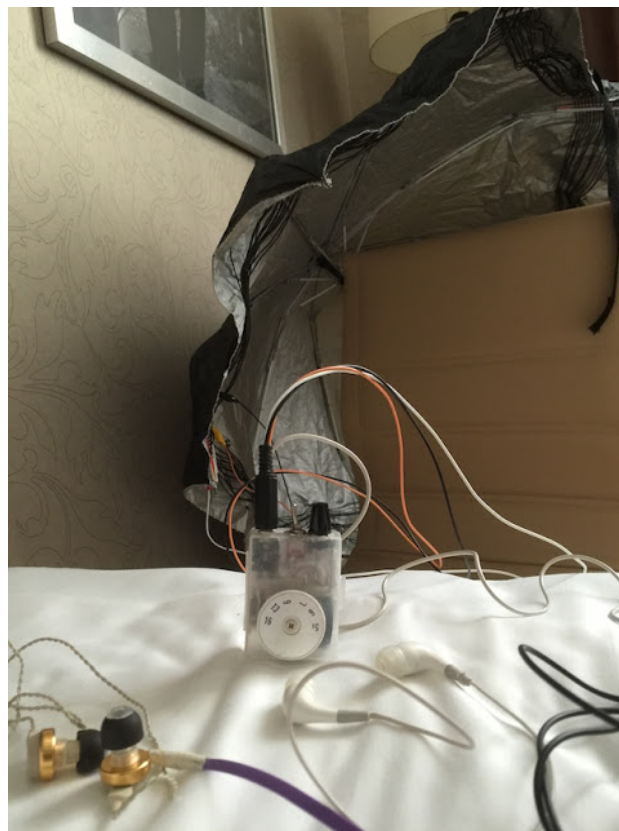
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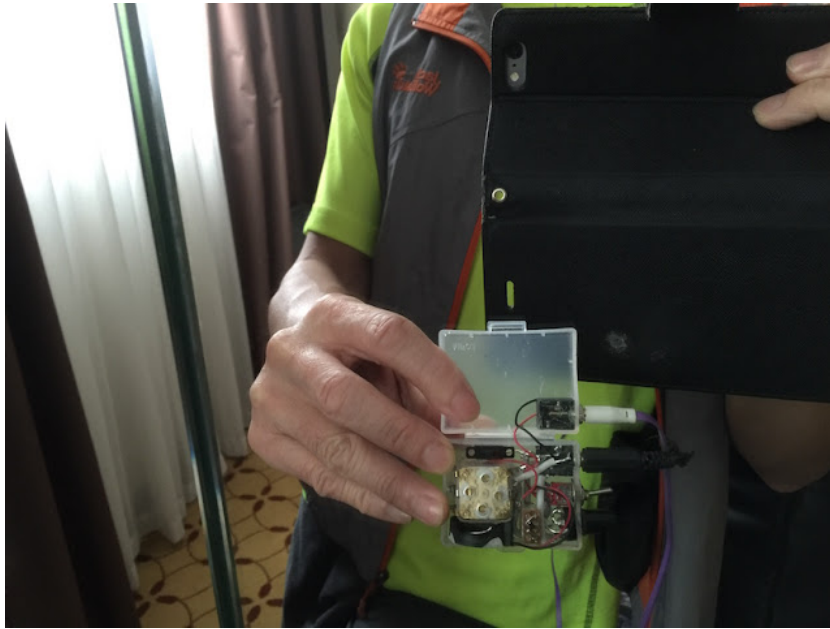
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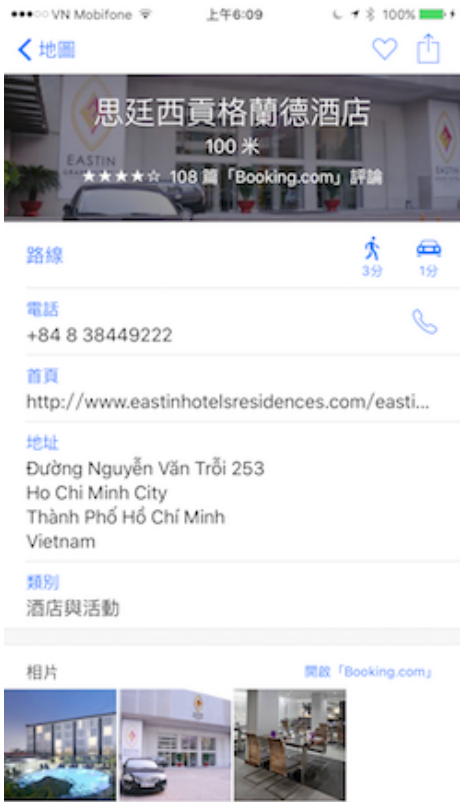
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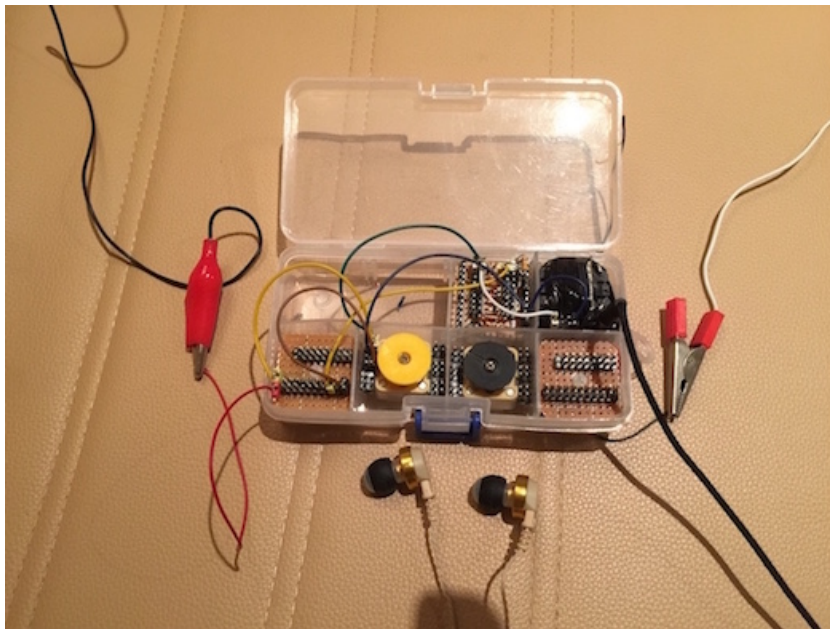
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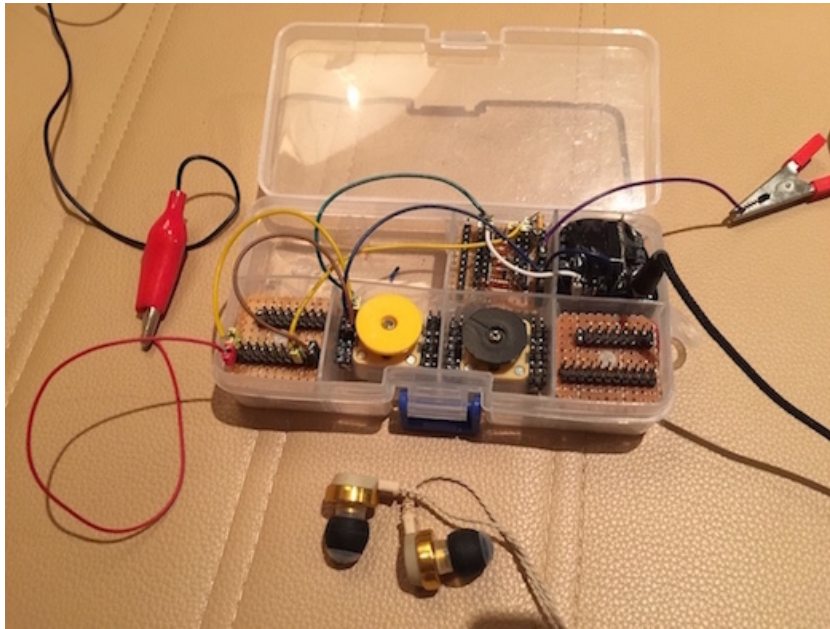
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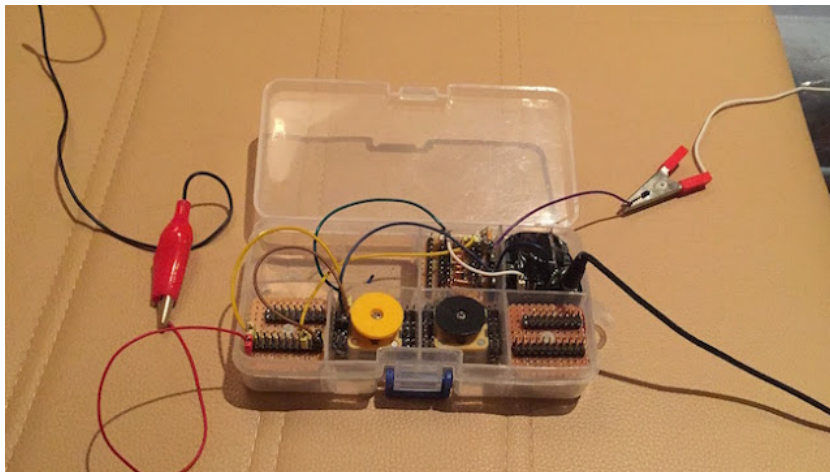
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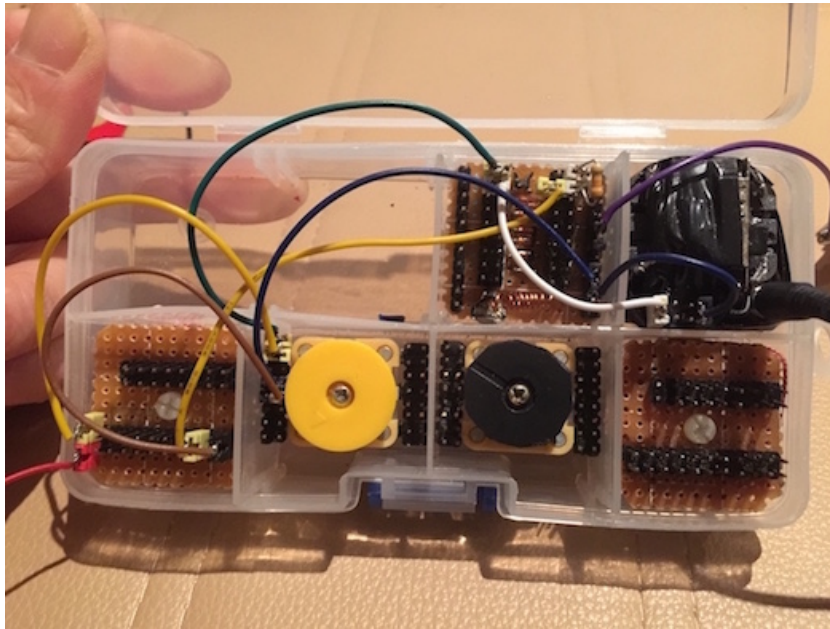
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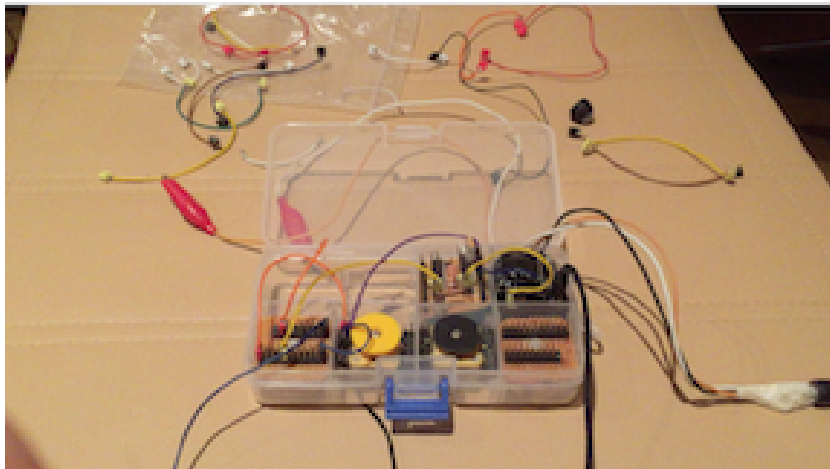
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Hanoi, Vietnam				
AM RADIO				
549	-	+	VOV2	- Hanoi
675	-	+	VOV1	- Hanoi
1242	-	+	VOV6 (International Svc.)	on FM - Hanoi
FM RADIO				
90.0	10kW	+	Hanoi Radio	- Hanoi
100.0	-	+	VOV3	- Hanoi
101.5	-	+	VOV6 (International Svc.)	- Hanoi
102.7	-	+	VOV2	rep - Tam Dao (Vinh Phuc)
105.5	-	+	VOV5	- Hanoi Eng., Fr., Russian, Viet.
Ho Chi Minh City (Saigon), Vietnam				
AM RADIO				
558	-	+	VOV2	rep - Ho Chi Minh City
610	100kW	+	Voice of the People of Ho Chi Minh City AM Channel	- Ho Chi Minh City
657	-	+	VOV1	rep - Ho Chi Minh City
747	-	+	VOV4	- Ho Chi Minh City
FM RADIO				
99.9	20kW	+	Voice of the People of Ho Chi Minh City FM Channel	- Ho Chi Minh City
104.5	-	+	VOV3	rep - Ho Chi Minh City
105.7	-	+	VOV5	rep - Ho Chi Minh City Eng., Fr., Russian, Viet.

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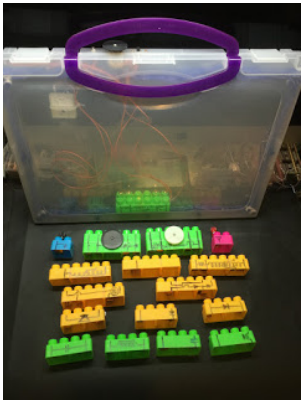
Posted 17th March 2016 by Billy

2 View comments

17th February 2016

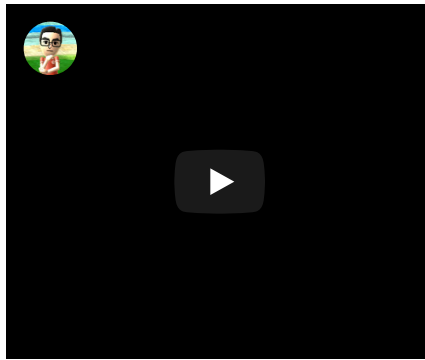
3D Building Blocks for Crystal Radio

Create 3D building blocks for crystal radios so kids and adults can experiment with crystal radios. There is also a portable case for you to take what you have created out on the street to listen to radio using the big loop antenna on the case.



[https://1.bp.blogspot.com/-D-
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Video link:
<https://youtu.be/dbaRQoExeOs> [https://youtu.be/dbaRQoExeOs]



I have seen similar building blocks used to build lights, fans, and even robots, but not crystal radios. Though this is a low tech construction, I've spent weeks trying to figure out which building block is suitable (big enough to house the variable caps and ferrite sticks) and flexible with different length and height. Most importantly, how to make the connectors between the blocks so it's plug and play and yet the contacts are firm enough to be carried around.

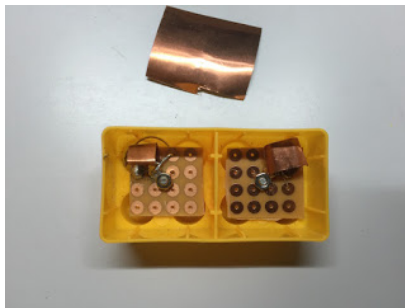
I thought of using springs, but the extra turns for each connection may interfere with wireless signals. Finally settled with copper screws and elastic copper sheets that do the same magic as springs.



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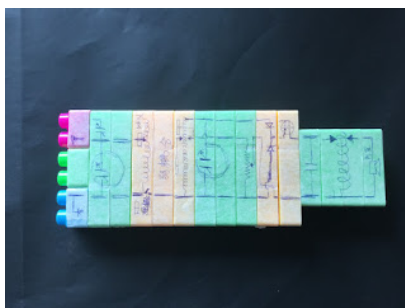
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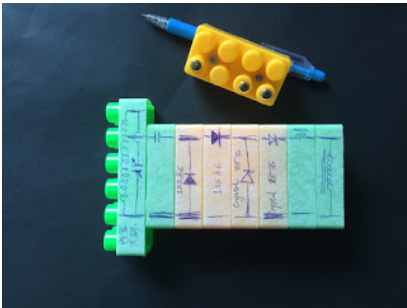
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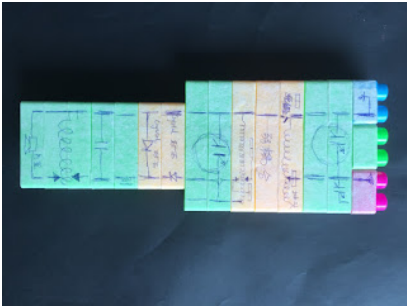
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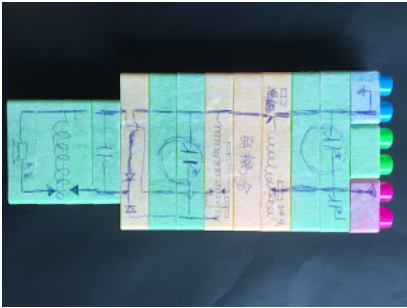
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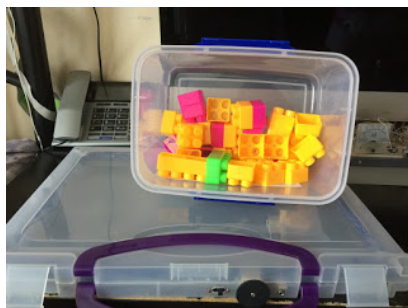
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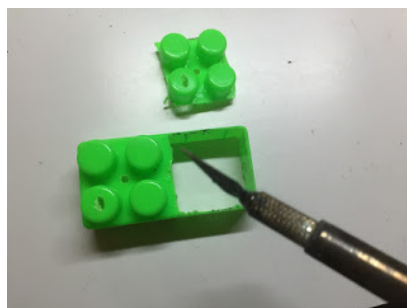
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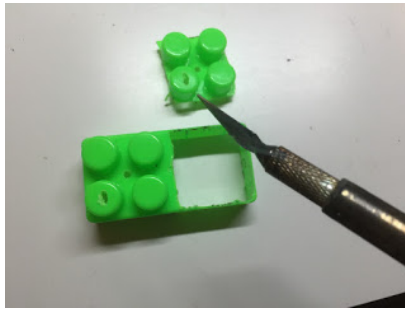
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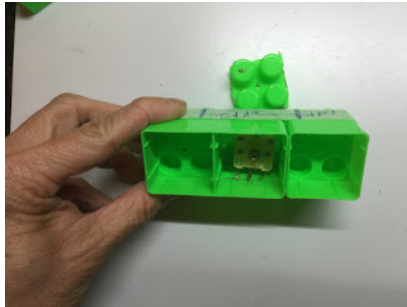
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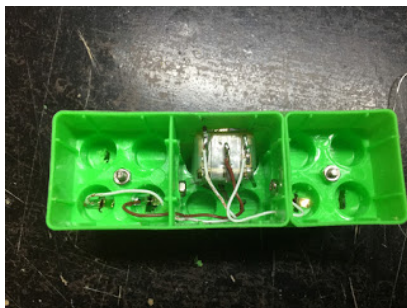
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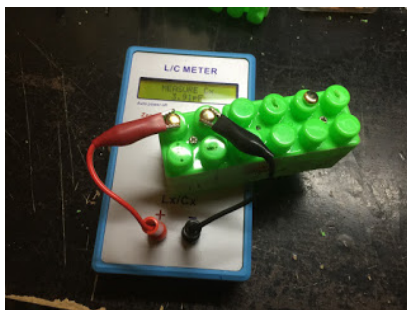
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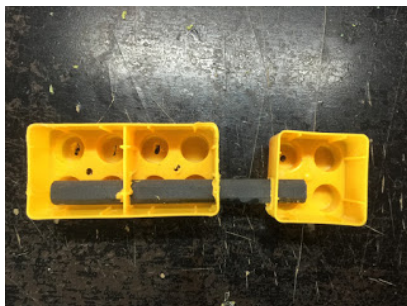
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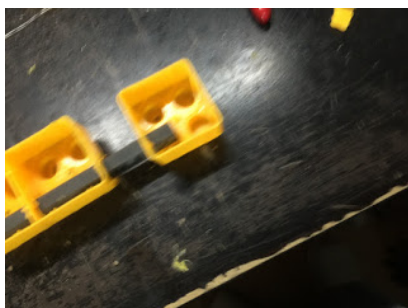
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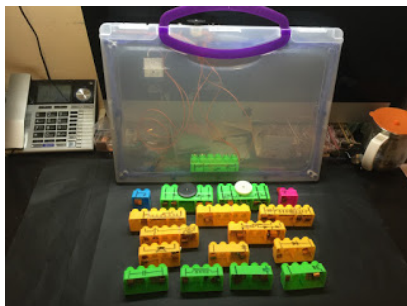
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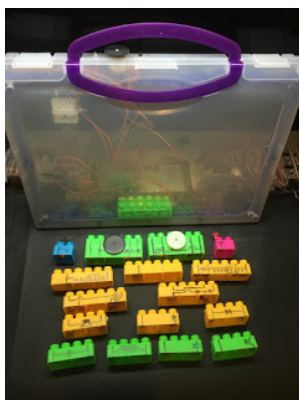
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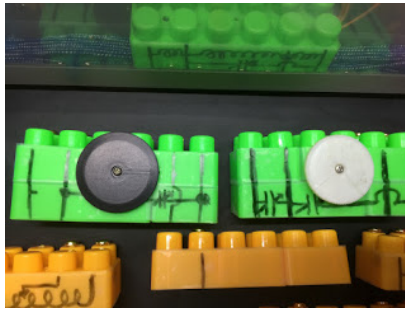
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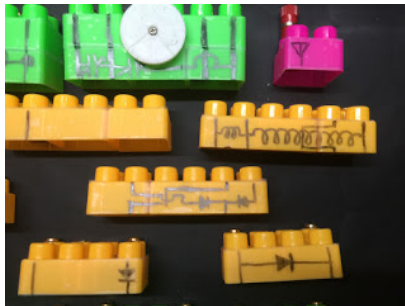
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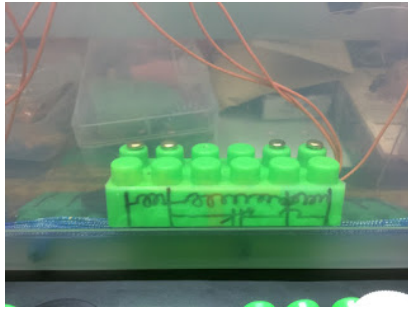
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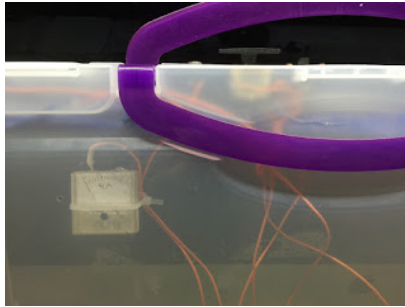
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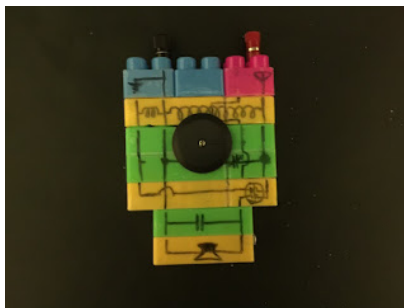
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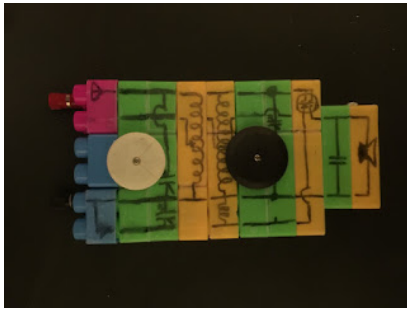
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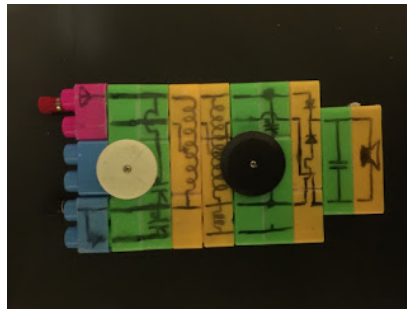
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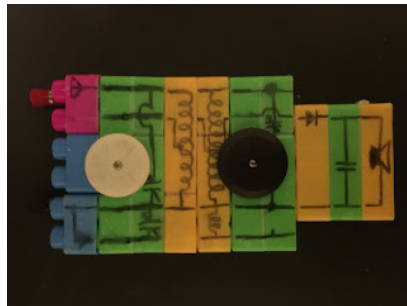
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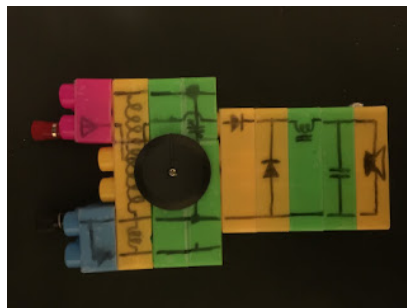
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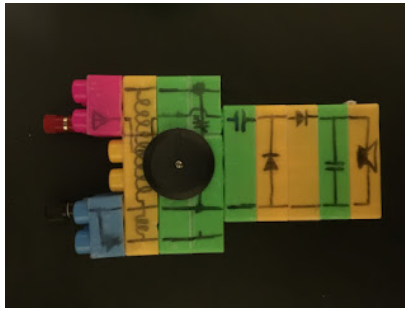
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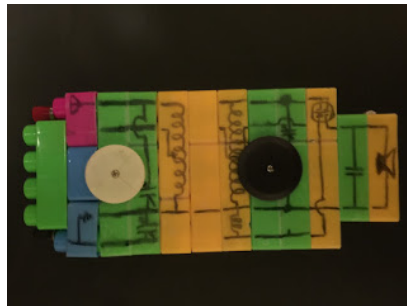
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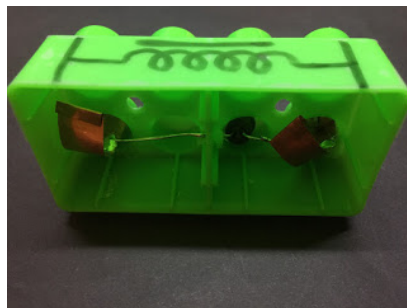
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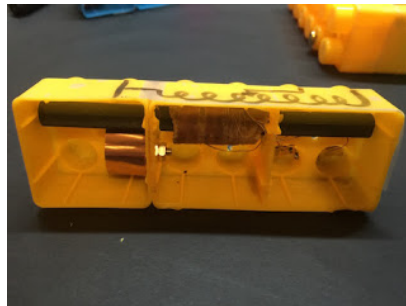
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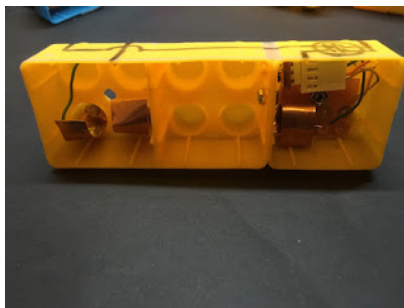
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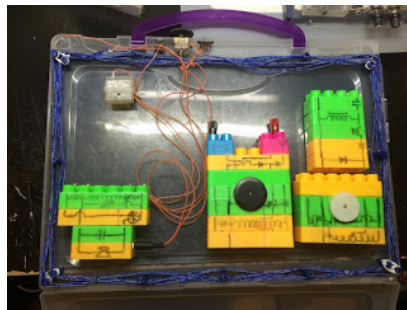
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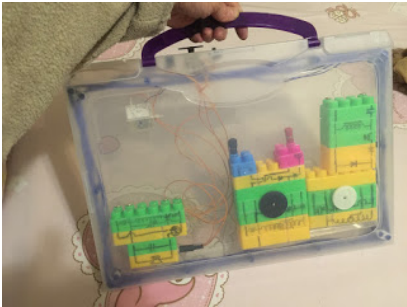
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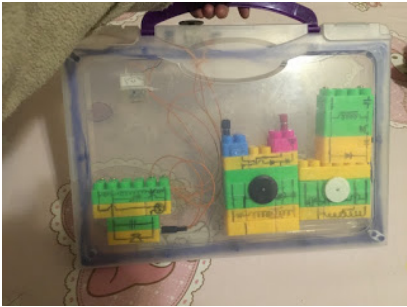
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Posted 17th February 2016 by Billy

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Hot Off Market Way Below Market...
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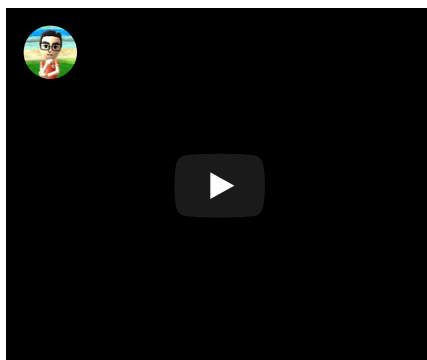


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\$650,000

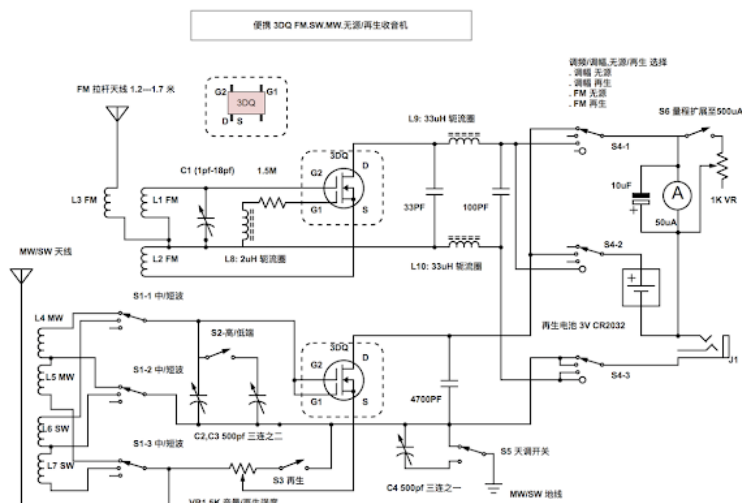
M

11th February 2016 Portable 3DQ FM SW MW Crystal. Regen. Radio

I created a portable FM SW MW Crystal Set with region functions using a combination of big loop and ferrite toroids.



Circuit Diagram



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Components

S1 MW/SW Selection

S2 MW/SW Hi Band/Low Band Selection

S3 Switch attached to VR2, turn on for region adjustment or volume adjustment.

S4 Selection for FM or MW/SW and Regen or Battery Free Radio.

S5 Antenna adjustment switch

VR1 Volume or Regen effect adjustment. with S3 attached. Connect S3 to VR1 such that when resistance to 3DQ-S is the lowest, S3 will stay open.

L8 using a 1.5M 1/4 W resistor as the frame, wind 30 turns of 0.07 or 0.1 mm magnet wire.

L9, L10 using a 1.5M 1W resistor as the frame, wind 100 turns of 0.07 or 0.1 mm magnet wire.

C1 1pf-18pf butterfly high Q variable capacitor.

C2, C3, C4 3x500pf VR.

J1 connect to a reed headphone with impedance of 300 to 600 ohms.

3V CR2032 Button Battery for Regen.

L1 make a 120mm diameter C-shape loop (with a 50mm opening) using 12mm diameter soft copper pipe.

L2 make a 25mm diameter C-shape loop using 1 mm diameter silver plated copper wire. Wound in same direction as L1.

L3 make a 25mm diameter C-shape loop using 1 mm diameter silver plated copper wire. Wound in same direction as L1.

This Crystal Set can hook up to big loop coils or toroid coils.

For toroid coils:

L4 use a ferrite toroid with permeability of 100u (NXO100) diameter 37mm, height 7 mm, wind 50 turns using 175x0.04mm Litz wire.

L5 On the same toroid, using same type of litz wire, wind 10 turns in the opposite direction as L4.

L6 use a ferrite toroid with permeability of 100u (NXO100) diameter 31mm, height 7 mm, wind 12 turns using 1mm magnet wire.

L7 On the same toroid, using same type of magnet wire, wind 4 turns in the opposite direction as L6.

For big loops:

like winding on a toroid.

L5 On the same frame, using same type of litz wire, wind 1 turn in the opposite direction as L4.

L6 make a 1 Meter diameter C-Shape loop (with a 100mm opening) using 12mm diameter soft copper pipe.

L7 make a 0.5 Meter diameter C-Shape loop (with a 100mm opening) using 9 mm diameter soft copper pipe.



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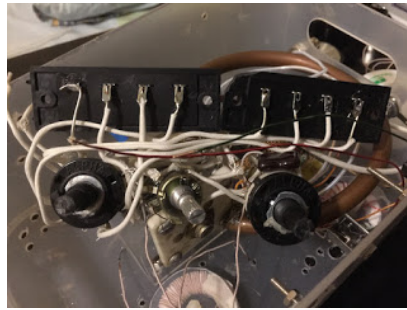
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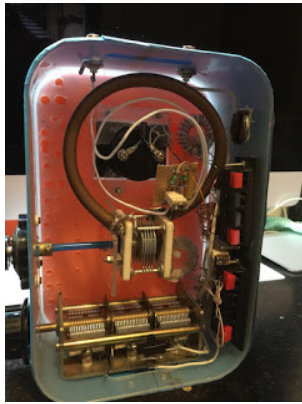
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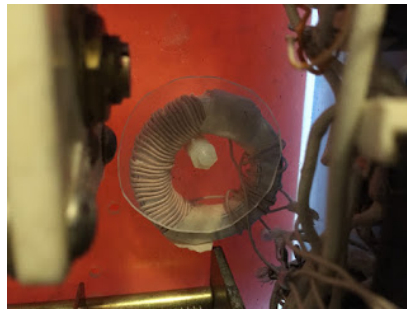
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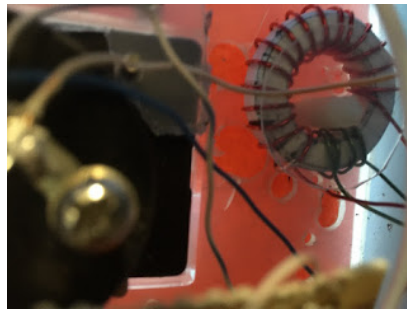
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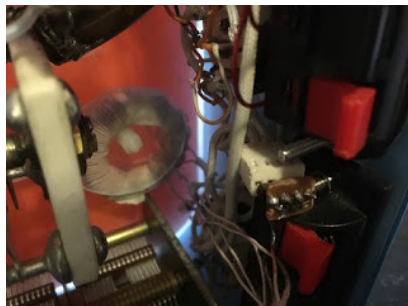
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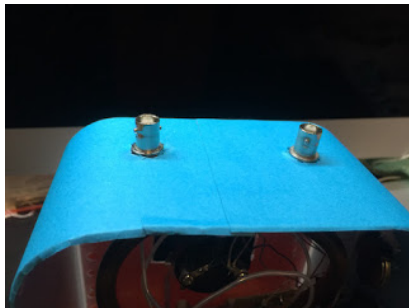
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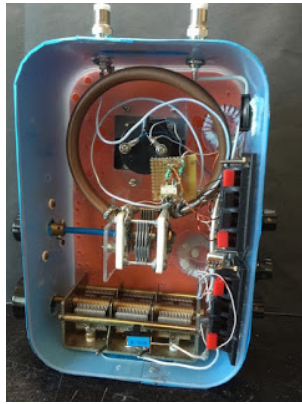
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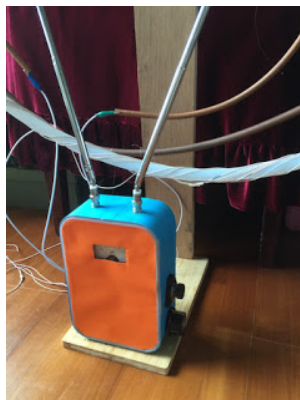
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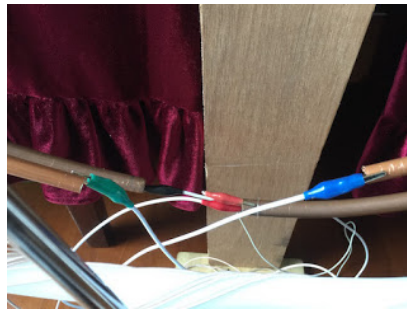
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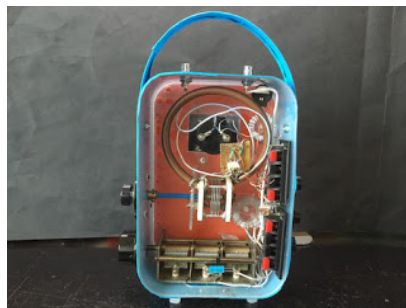
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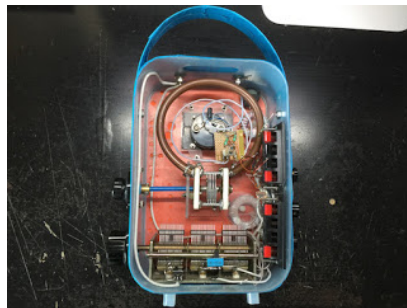
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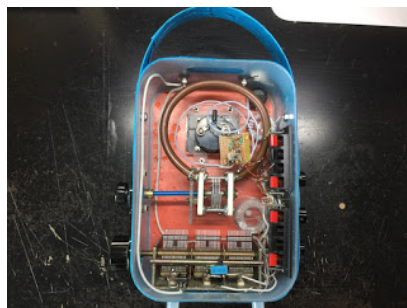
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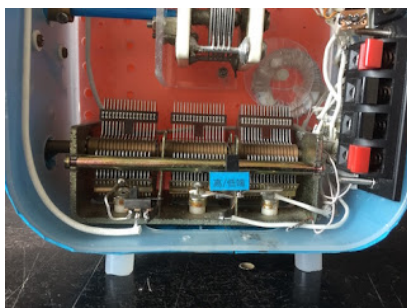
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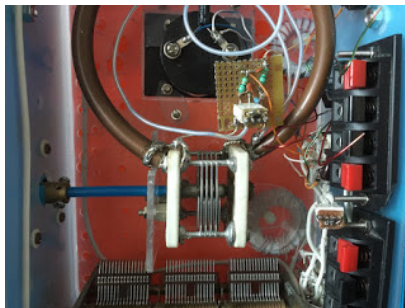
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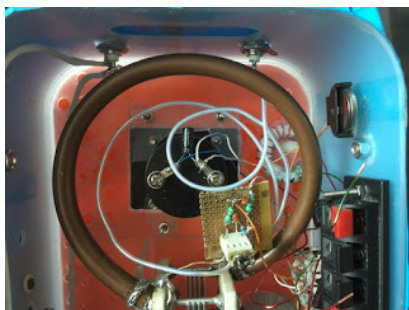
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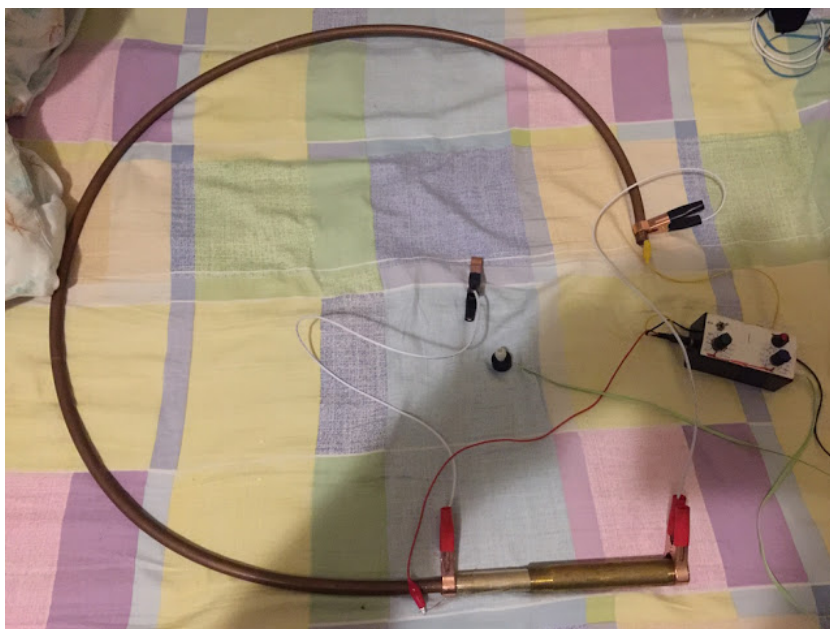
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Posted 11th February 2016 by Billy

0 Add a comment

14th January 2016

Copper Tube SW radio with a DIY Var Cap.



[http://2.bp.blogspot.com/-p9mh-YtSKY4/VpfAbwcyOsl/AAAAAAAAACOk/WLb3ysgAoSw/s1600/IMG_5301.JPG]

I have built a very simple portable short wave radio that can receive stations without an antenna using half inch or quarter inch copper tubes.

First band the tube into a circle with a diameter close to 1 meter (I used 0.8 meter) but do not close the loop. Leave an opening of around 30 degree to 45 degree.

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cover the lower SW frequencies) in parallel to both end of the tubes.

Connect one end of the tube to a Crystal radio diode eg 1N34A or 1N60 or even better with ^{1s106} that I used.

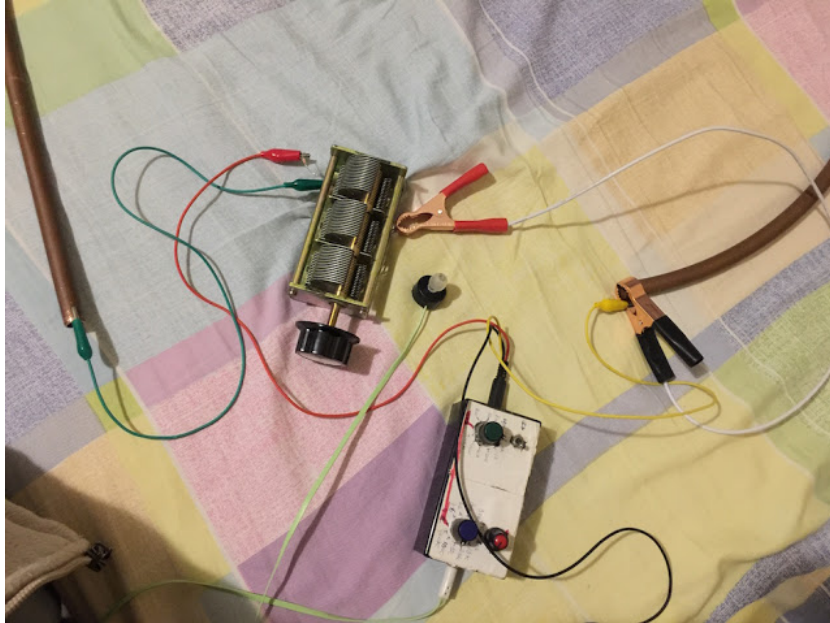
Connect the other end of the diode to a head phone with a impedance that matches that of the output from the diode. Otherwise a transformer will be required to match the impedance. Connect the other end of the tube to the Other end of the headphone. IN the picture below, I used a transformer that step up from 1.5K to 5K to match the impedance of the crystal earphone I am using.

If you are using a magnetic headphone, add a 2000-4000pf capacitor in parallel to it to improve the audio quality.

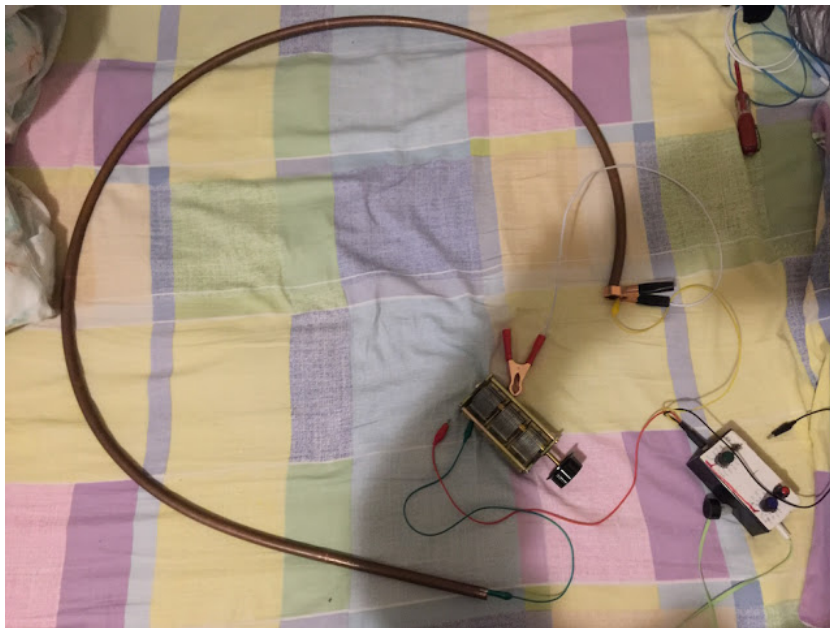
If you are using a Crystal headphone (aka piezo electric), use a transformer like what I did below for better audio quality, or add a 50k to 1M resistor in parallel to it to sound better.

Placing this horizontally next to my window from my 56/F apartment facing the sea, I can receive SW stations broadcasted from mainland China, Taiwan and other South Asian countries next to Hong Kong. The loudness will rise and drop within a minute as the SW signal is reflected from afar.

Here are some pictures:



[http://4.bp.blogspot.com/-eOo2a8kKAoo/Vpe73-Jq95I/AAAAAAAAACNw/vduQY4dvGME/s1600/IMG_5300.JPG]



[http://1.bp.blogspot.com/-23NdhzZmycQ/Vpe73za4TYI/AAAAAAAAACN0/j5X1GFvL0io/s1600/IMG_5299.JPG]

Technically you can DIY your own Var cap also using the copper tube. Instead of banding it to a circle. Band it to form a letter C with a long horizontal tail at the bottom. Then you can place an insulated wider copper tube on top of the tube used for the coil. If the two tubes are close enough together i.e. The gap is less than 0.5 mm, By sliding the outer tube in and out, you can vary the capacitance between them. I guess depending on the surface area and how tightly the two tubes are placed together, the capacitance can vary between 20pf to 500pf. The Q factor will be effected by what is being used as the insulator, Air is best but hard to avoid short circuit. Plastic sheets may work, but will be low Q. I haven't tried this on SW yet, only on FM.

Here is some diagrams that show you how this will look like.

I mounted another hard straight copper tube covered with plastic sheet (diameter 3/4 Inch) to the original C-Shaped copper tube (diameter 1/2 inch) that forms the coil of the SW Crystal Radio. Because this will increase the surface area and the capacitance. Also the hard straight copper tube has less gap with the wider copper tube (diameter 1 inch), and can slide in and out smoothly.

You can always increase the length of the two copper tubes forming the variable cap by extending the length of these two copper tubes.

You can see from my Capacitance Meter that the DIY Var. Cap can go from 12pf (the outer tube all outside) to 318pf (the outer tube all inside).



[http://3.bp.blogspot.com/-caLYoPy3lUk/VpeZPFAOWyI/AAAAAAAAACNA/peDmNZNbK9Q/s1600/IMG_5297.JPG]

Will give it a go when I have some time.



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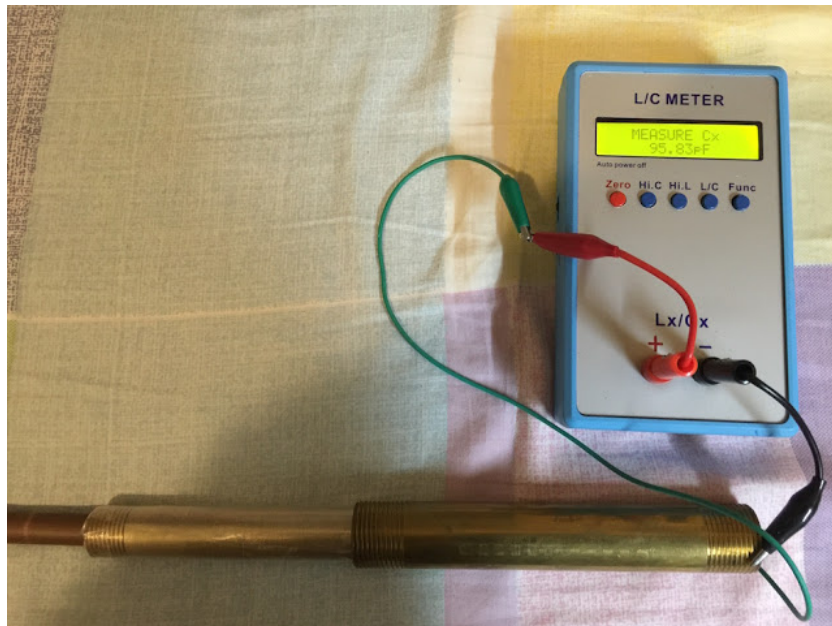
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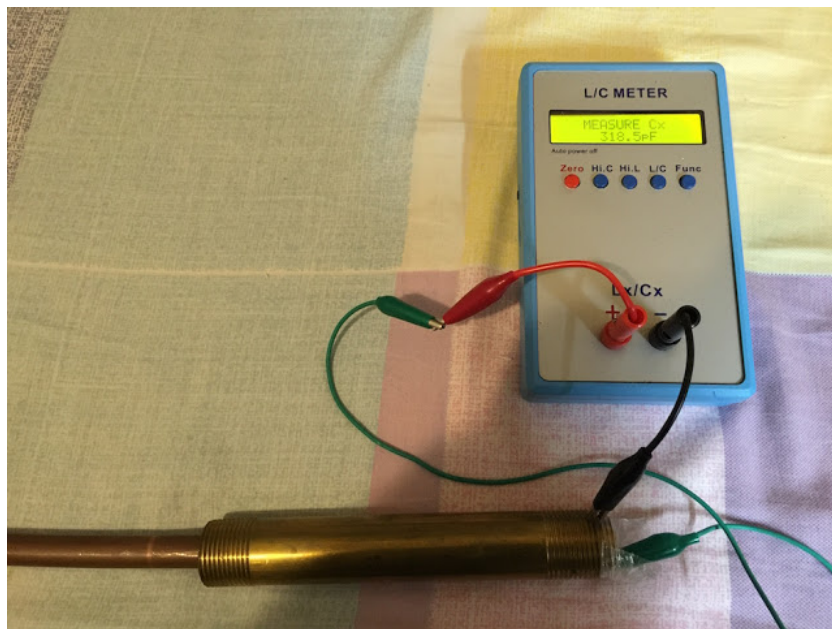
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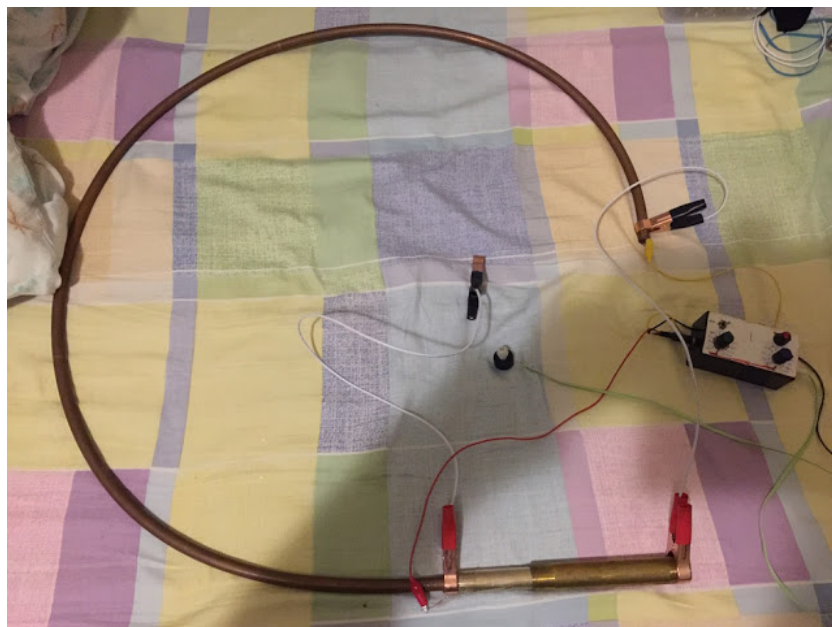


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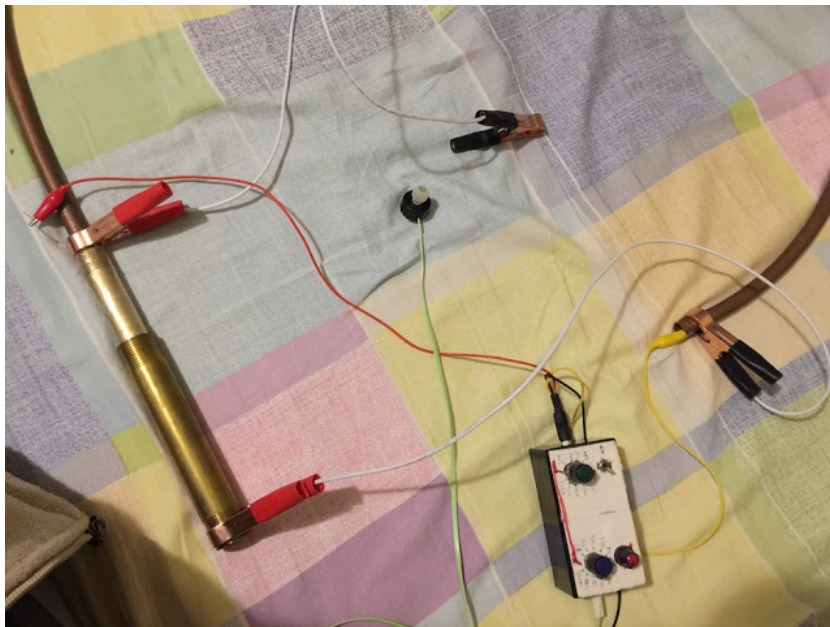
I hooked it up to the diode and the crystal earphone through a transformer 1.5K to 5K to match my crystal earphone.

The loudness of this SW crystal set made using this DIY var. Cap is comparable to that when I used my high Q 500pf Var Cap above. However, tuning is not as stable as the regular Var Cap and you need to adapt to it to learn how to tune. As the copper tube sometime shifts and get loose which alter the Capacitance. With the already varying strength of the SW signal itself, it's even harder to tune and keep the SW station. However, this proof of concept works well.

See how it's hooked up.



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Posted 14th January 2016 by [Billy](#)

0 Add a comment

8th January 2016

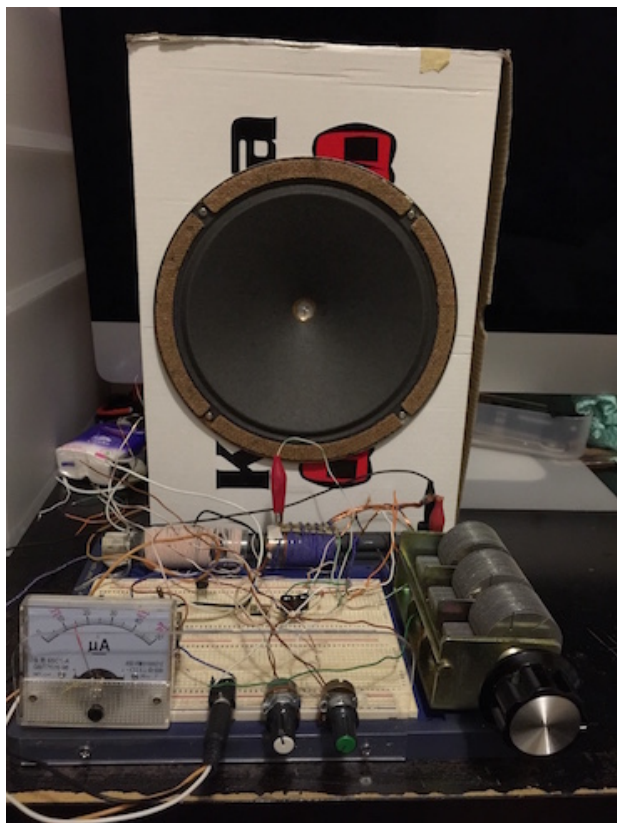
Simple Crystal Radio driving an 8 inch speaker

I experimented with a very simple two stage circuits with a single diode that drive an 8 inch speaker. Though not loud, but it's clearly audible within my quiet room.

Diode: 1ss106.

Distance from the nearest broadcasting station : 15KM.

Antenna 15 meters of 660x0.04 Litz wire drop down from my window 56/F floor, pushed out to 2 meters away from the wall of the building.



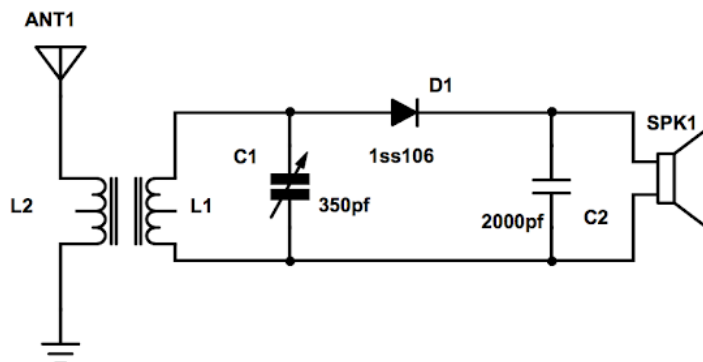
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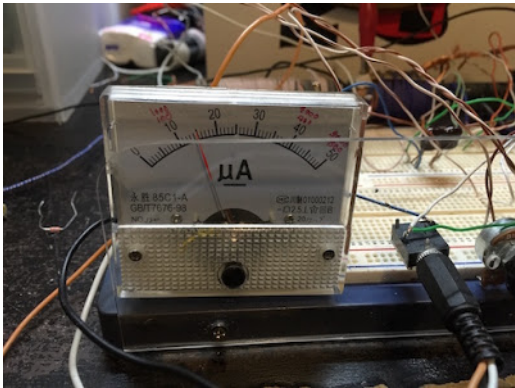
I can achieve a DC current of 150uA when using this conventional single Diode circuit.

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Single Diodes Crystal Radio Circuit



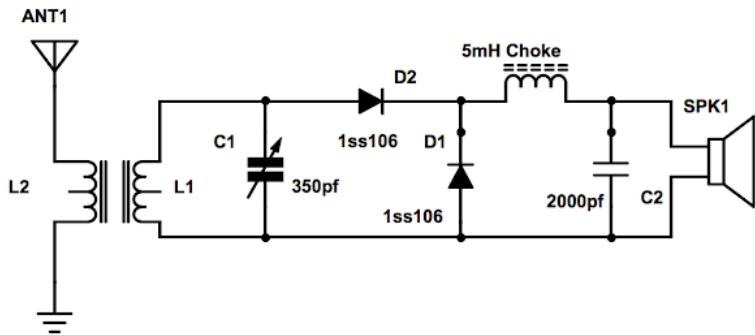
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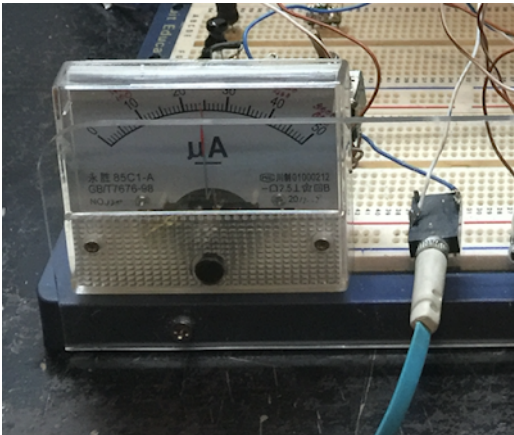
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Then I tried this dual Diode circuit invented by a member of the Chinese Crystal Radio Forum.
I can boost the DC current to 250uA.

Dual Diodes Crystal Radio Circuit



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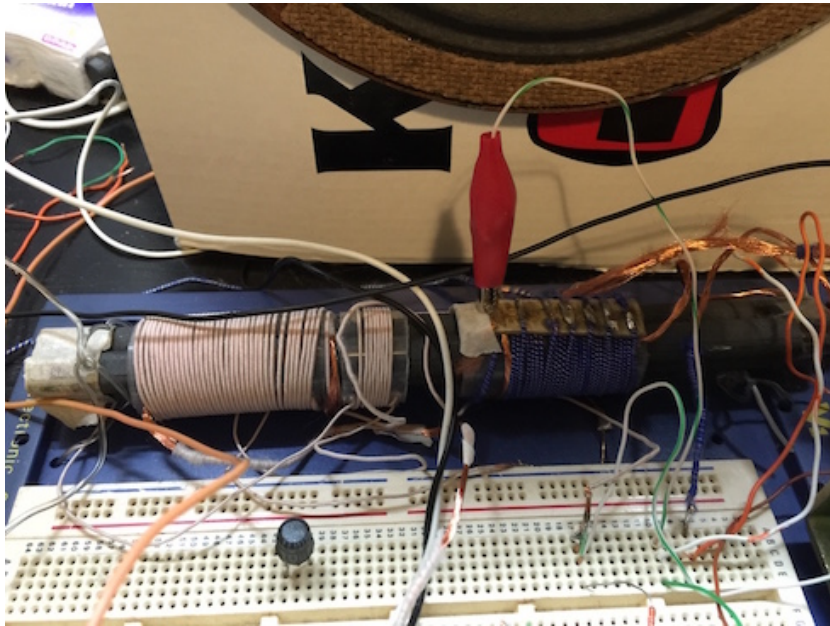


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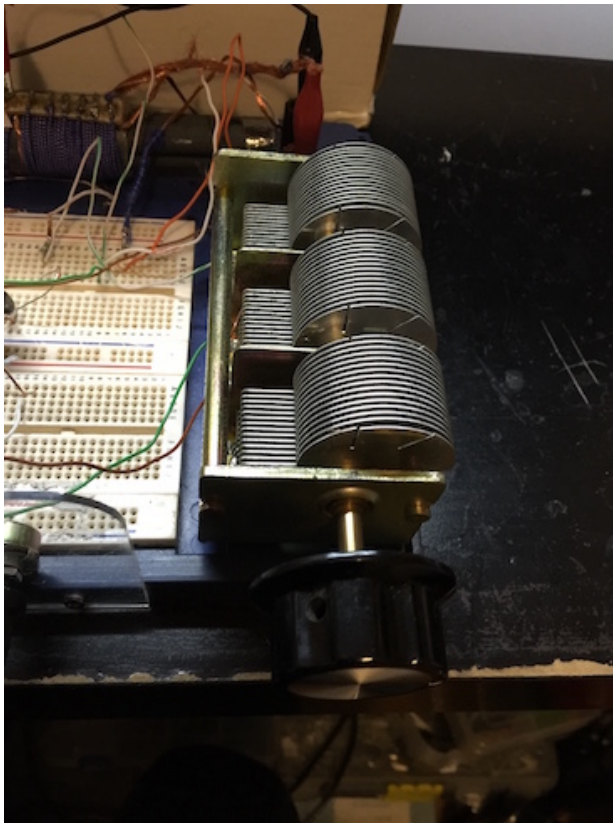
Here is the video clip.

<https://youtu.be/5NWsHX0kwe4> [<https://youtu.be/5NWsHX0kwe4>]

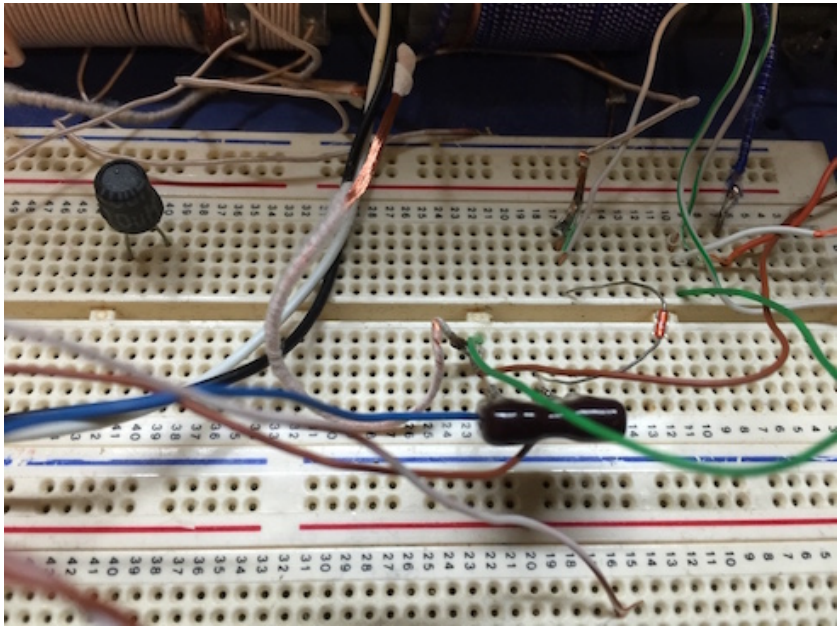
Here are the pictures.



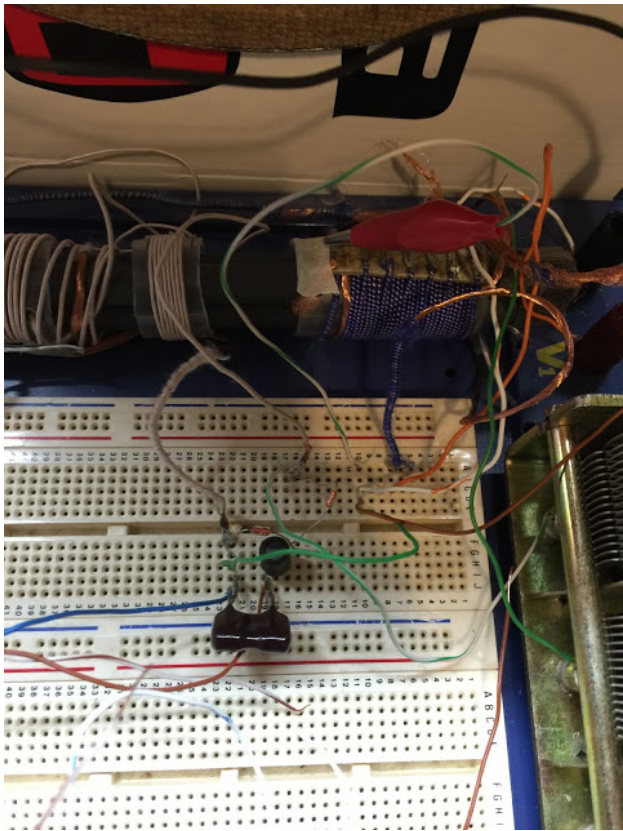
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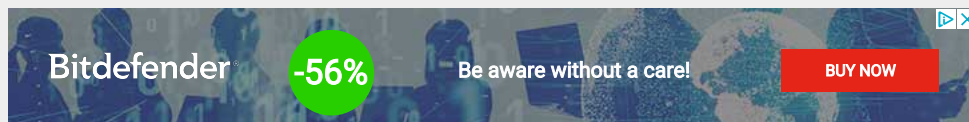
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Posted 8th January 2016 by Billy

1 View comments



31st December 2015

SC2-300 foldable headphone

Happy New Year to you.

I decided to give myself a new headphone by converting a faulty monster head phones to crystal radio headphone with two SC2-300 Reed ear pieces.

After fixing the sponge to the headphone, it can be worn comfortably, with good audio effect. The impedance is around 600 ohm when two ear pieces are in series.



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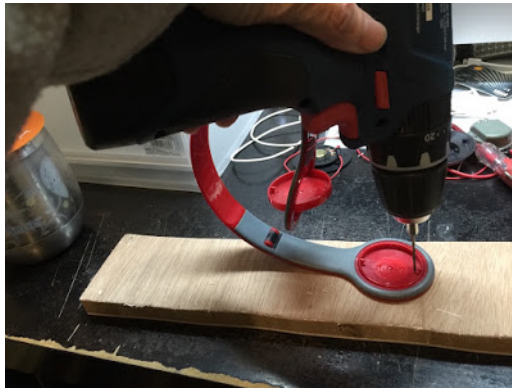
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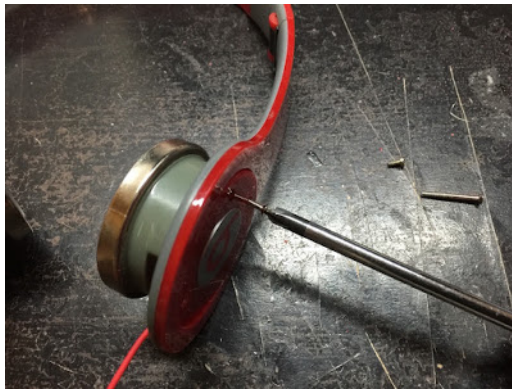


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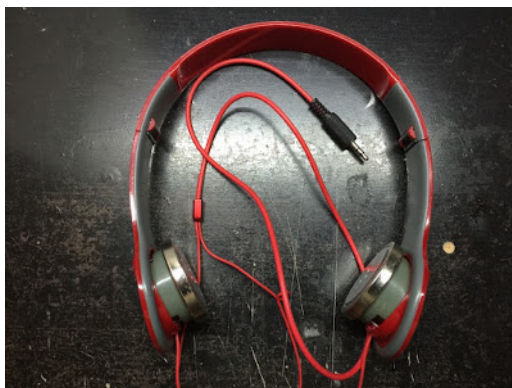
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Posted 31st December 2015 by [Billy](#)

0 Add a comment

10th October 2015

How to clean install OSX to a Fusion drive and keep the recovery hard disk function

A. Clean reinstall of OSX.

1. Make sure you back up all your data on the hard disk, as the following step will erase all data.
2. Create the OSX Install USB drive, insert it to the MAC workstation.
3. Since we will operate on the internal boot up drive of the Mac, we need to boot to OSX Install USB drive (See V).

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4. At the menu at the top of the screen, select disk utilities.
5. Highlight the Fusion Drive volume called "Macintosh HD". Click Erase to clean it up.
6. If its successful, then go ahead to install new OSX to this partition as usual.
7. Otherwise if this failed, that means fusion drive has been damaged.
8. Follow onto Be to fix it.

B. Split the Fusion Drive into physical hard disks.

1. Since we will operate on the internal boot up drive of the Mac, assumes that we've already boot up to OSX Install USB drive (See Y.).
2. At the menu at the top of the screen , select Utilities and Terminal.
3. On the terminal screen type:

diskutil cs list.

You will see something similar to the screen below.

4. Copy the long string after Logical Volume and replace UUID with it in the following command to delete the fusion drive logical volume (aka coreStorage logical volume) :

diskutil cs deletevolume *UUID*

For example:

diskutil cs deletevolume E59B5A99-F8C1-461A-AE54-6EC11B095161

5. Copy the long string after Logical Volume Group and replace UUID with it in the following command to delete the fusion drive (aka coreStorage) :

diskutil cs delete *UUID*

e.g. diskutil cs delete E03B3F30-6A1B-4DCD-9E14-5E927BC3F5DC

6. At this step, the fusion drive has been deleted, and the SSD hardsisk and the mechanical hard disk will be reappearing in diskutil as separate disks.

C. Install a fresh copy of OSX to the SSD hard disk and test that recovery hard disk partition works.

1. Go to diskutil to create a partition called Machintosh HD in the SSD hard disk using all the space there.
2. Do the same with the mechanical hard disk.
3. Follow the usual process to boot from the OSX install USB and install a fresh copy of OSX to the SSD hard disk.
4. This will create the proper boot up partitions, recovery hard disk partitions and the PSX partitions on the SSD hard disk.
5. Once the install is complete, test if OSX can start properly, but no need to go through the initial MAC OSX set up as we'll to scrap this and do the install once again later.
6. We now need to test if the recovery hard disk partition works.
7. Reboot to recovery hard disk (see X - by pressing and holding Command and R at the same time during boot up right after you heard the boot up sound, and only release it a few seconds after you see the apple logo and the progress bar for loading..)
8. This is important to test and make sure the recovery hard disk partition .

D. Recreate the fusion drive

1. Since we will operate on the internal boot up drive of the Mac, we need to boot to OSX Install USB drive (See Y.).
2. At the menu at the top of the screen , select Utilities and Terminal.
3. On the terminal screen type:

You should find that we have a list of physical hard disks only, no logical volume group there yet.

4. You will see something similar to the screen below.
5. Look for the largest partition on the SSD hard disk that should be close to the full hard disk size of the SSD (e.g. 121G), and mark the device name, this will usually be something like /dev/disk0s2
6. Look for the largest partition on the mechanical disk that will form the fusion drive with the SSD hard disk. This should be close to the full hard disk size of the mechanical hard disk (e.g. 3TB), and mark the device name, this will usually be something like /dev/disk1s2
7. Now we will create the fusion drive group (a.k.a. logical volume group) by typing this command: **diskutil cs create *lvGroupName device1 device2***

For example:

```
diskutil cs create fusiondrive /dev/disk0s2 /dev/disk1s2
```

You will see something like below showing up on the screen:

Creating Core Storage Logical Volume Group

Switching disk0s2 to Core Storage

Switching disk1s2 to Core Storage

Waiting for Logical Volume Group to appear

Discovered new Logical Volume Group "DBFEB690-107B-4EA6-905B-2971D10F5B53"

Core Storage LVG UUID: DBFEB690-107B-4EA6-905B-2971D10F5B53

Finished CoreStorage operation

8. Copy down the string after "Discovered new Logical Volume Group" using command + C
9. Next, create the fusion drive partition (a.k.a. logical volume) named "Macintosh HD" by typing this command:

Diskutil cs createVolume *lvgUUID type name size*

For example:

```
Diskutil cs createVolume DBFEB690-107B-4EA6-905B-2971D10F5B53 jhfs+ "Macintosh HD" 100%
```

10. Go to diskutil to verify that you can see this newly created partition on the list.
11. Test by erasing all data from it.
12. Then you can go ahead to boot to the OSX Install USB drive and install a fresh copy of OSX onto it.
13. This will allow you to keep the recovery hard disk function.

X. How to boot to recover partition

Press and hold the command and R key together immediately after hearing the boot up bell sound.

Only release it 2 seconds after you see the Apple logo on the screen and the progress bar for booting. This will boot to recovery harddisk partition.

Y. How to boot to OSX Install USB

Press and hold the command and Option key together immediately after hearing the boot up bell sound.

Only release it 2 seconds after you see the Apple logo on the screen and This will provide you with a list of boot up disk to choose from, choose the OSX install USB to boot from.

[4](#) View comments

4th October 2015 My first Vacuum Tube Radio - a 26V+1.2V three tubes region.

I built My first Vacuum Tube Radio - a 26V+1.2V three tubes region. radio.



[http://1.bp.blogspot.com/-3Ay3MzXEPZQ/VhEscqD3JMI/AAAAAACGU/K0Js38_4W6Y/s1600/IMG_3123.JPG]

I spent 1 month collecting the components. The Chinese Vacuum tubes (1B2, 2P2) can be purchased from the Chinese Taobao shops @ half a USD each. The two transformers are 220V to 6V transformers. Capacitors and resistors are the standard ones. However, shipping them from China to HK is a bit of headache. There are more and more stringent restrictions for exporting of goods from China. I spent a while finding a courier service that can accept these goods and reship to Hong Kong. Shipping fees starts from USD 3 per KG. But special goods like these may take USD 6 per KG.

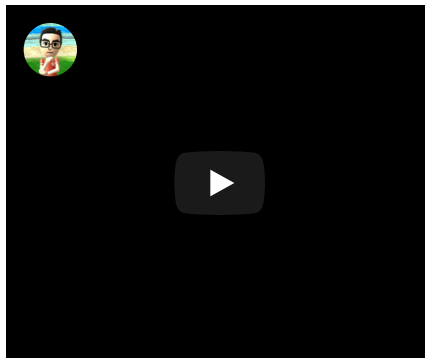
Then I cared too much about how the finished product looks. Spent 2 weeks finding the nice plastic box that is transparent enough.

Finally it all took place in the last few days. The initial circuit was designed by another Chinese hobbyist. The only modification I made is use a bigger coil (litz wire 0.04x220, instead of 0.04x60, and three ferrite rods instead of one), to make it more sensitive.

The negative feed back is somewhat too strong, I had to remove a few turns from the regen coil.

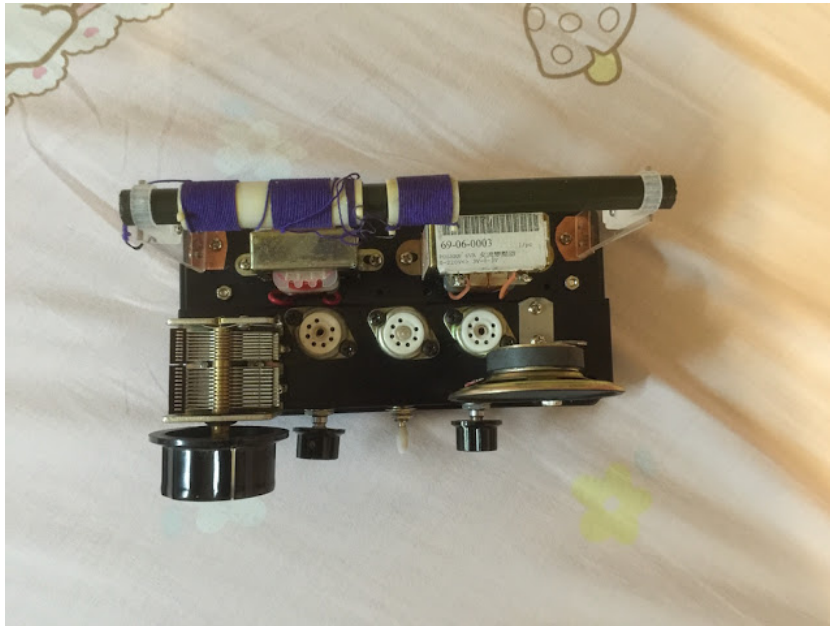
Here is how the finishing produce looks on the video.

<https://www.youtube.com/watch?v=IQ4Kv42QWsU> [<https://www.youtube.com/watch?v=IQ4Kv42QWsU>]





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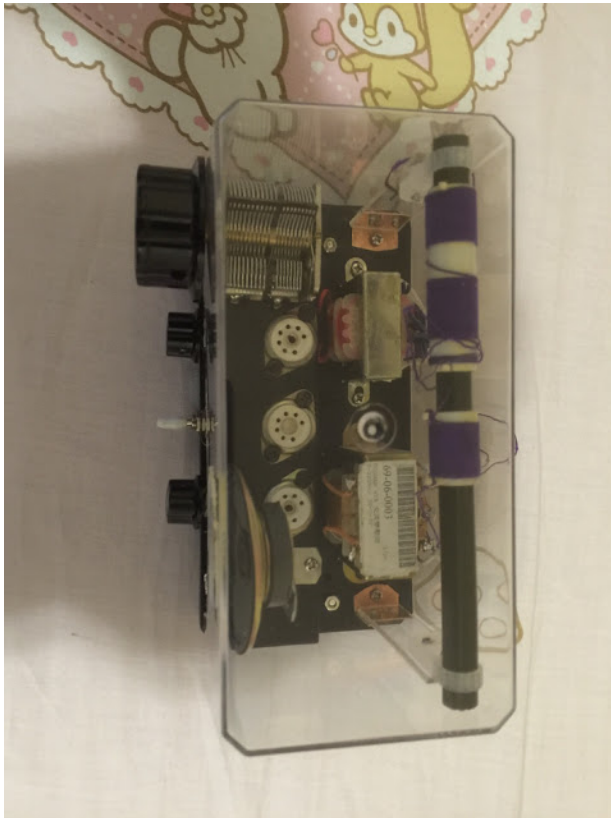
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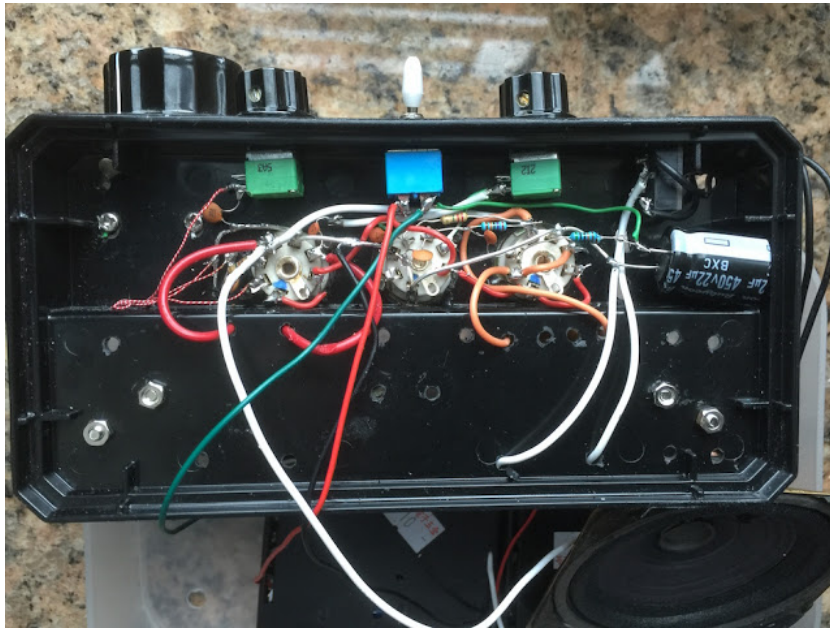
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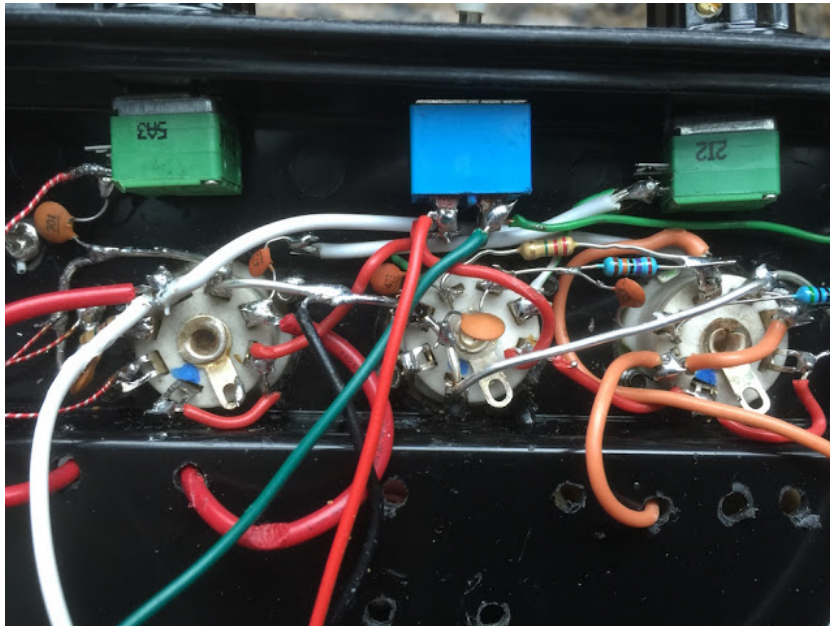
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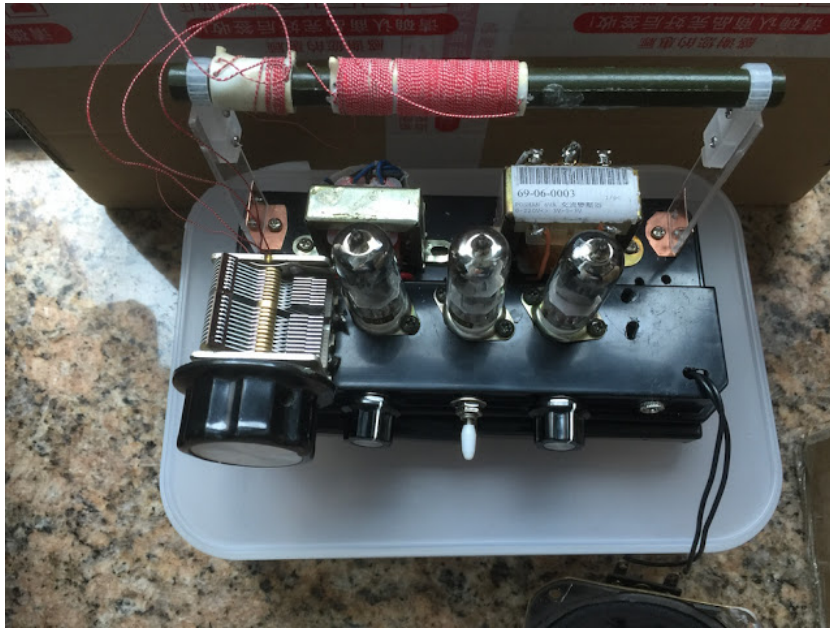
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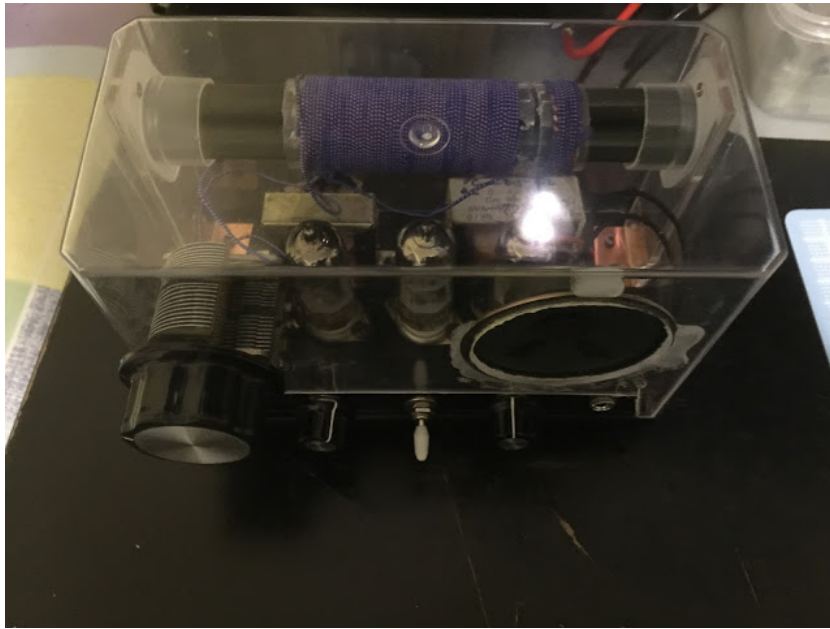
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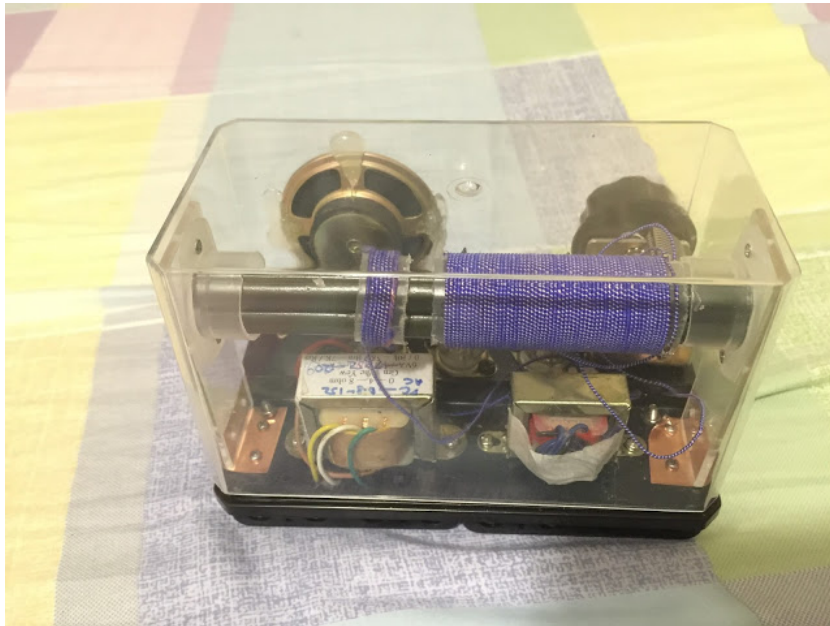
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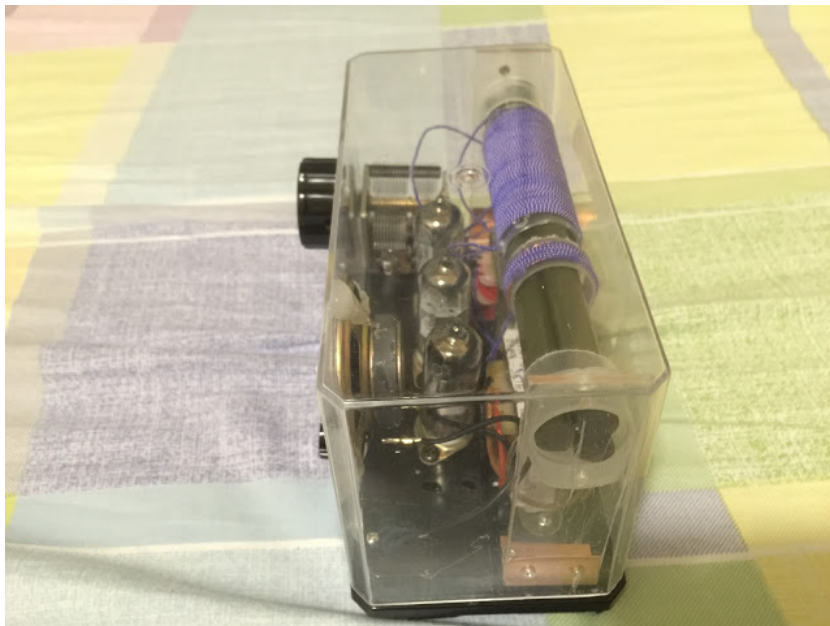
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Posted 4th October 2015 by Billy

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 SQUARESPACE

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26th September 2015 Chinese Lantern Crystal Radio

Tomorrow is the mid-Autumn Festival that the Chinese celebrate the festival of the moon. Children will light up their lanterns to shine through the parks.

What if that lantern can become a crystal radio.

Not only that, the candle light can energise the solar cells from the calculators to bring some small power to drive a regenerative radio to boost the speakers.

I made a lanterns and wind a number of coils to feed to the MOS FET 3DQ.

Next step is to find some solar cells. Those that will work with candle lights.

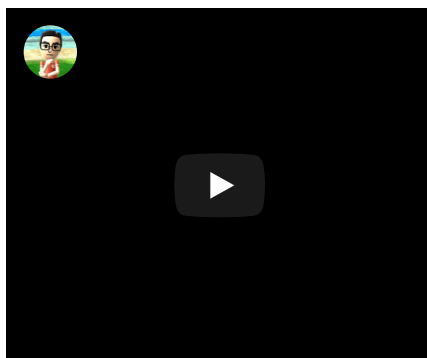
Here is what I made so far.

Now the crystal radio part is working well. I can listen to most of the local broadcast when I bring the lantern onto the street.

This does attract some people to stop by and listen to my crystal radio.

For the regenerative radio part, I need to find the solar cells to complete the project.

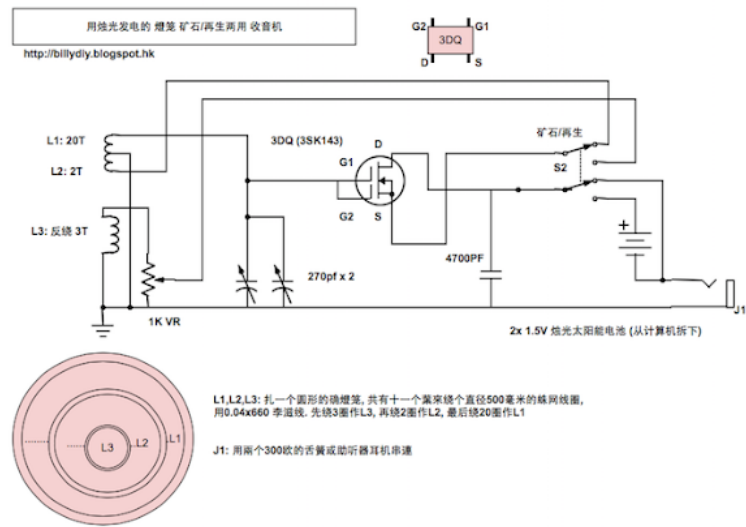
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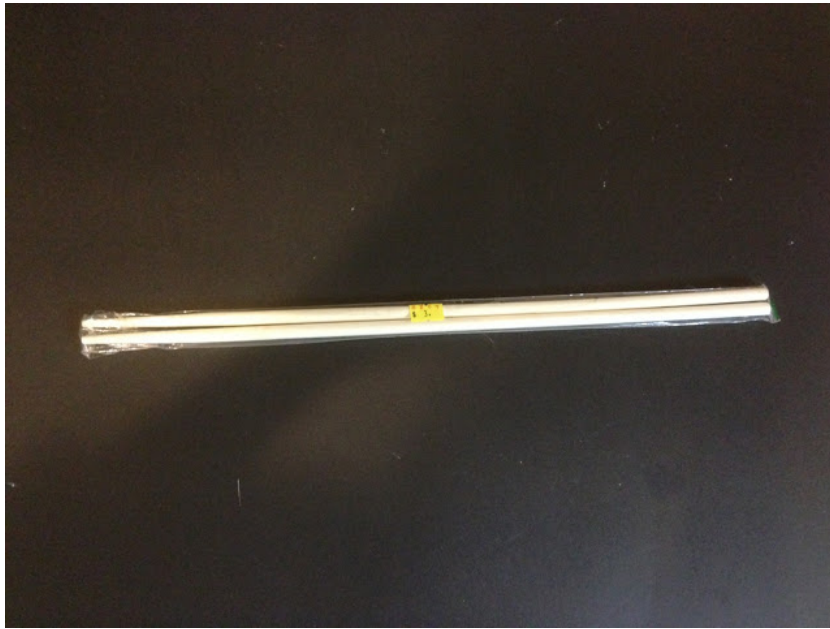
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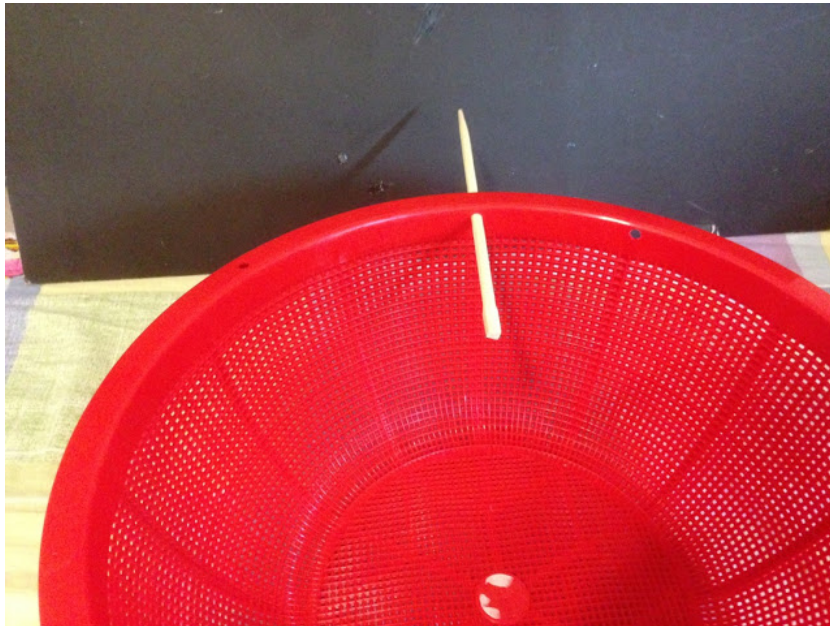
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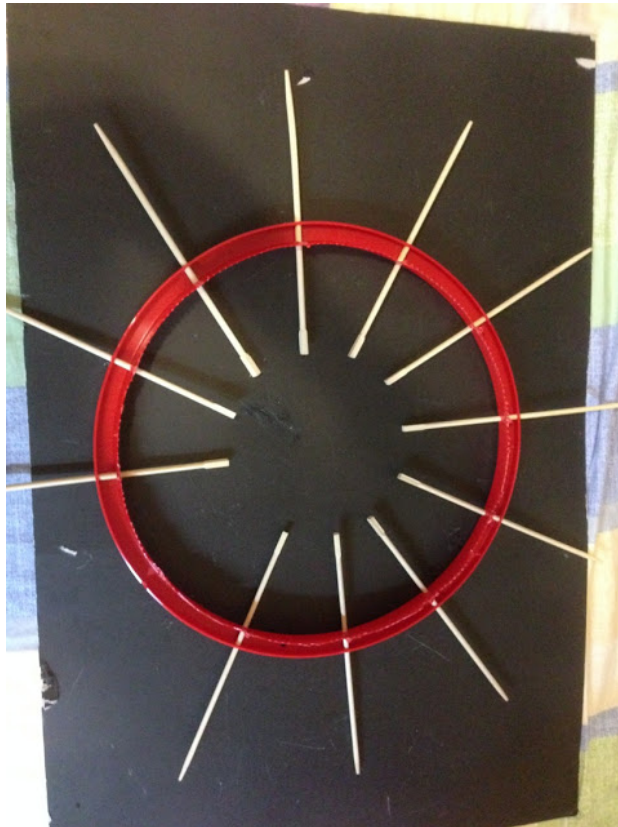
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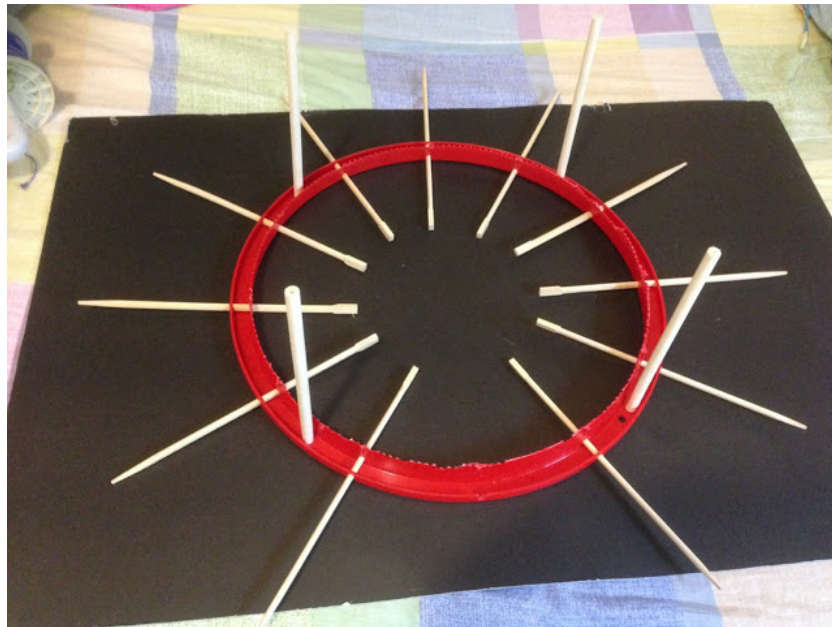
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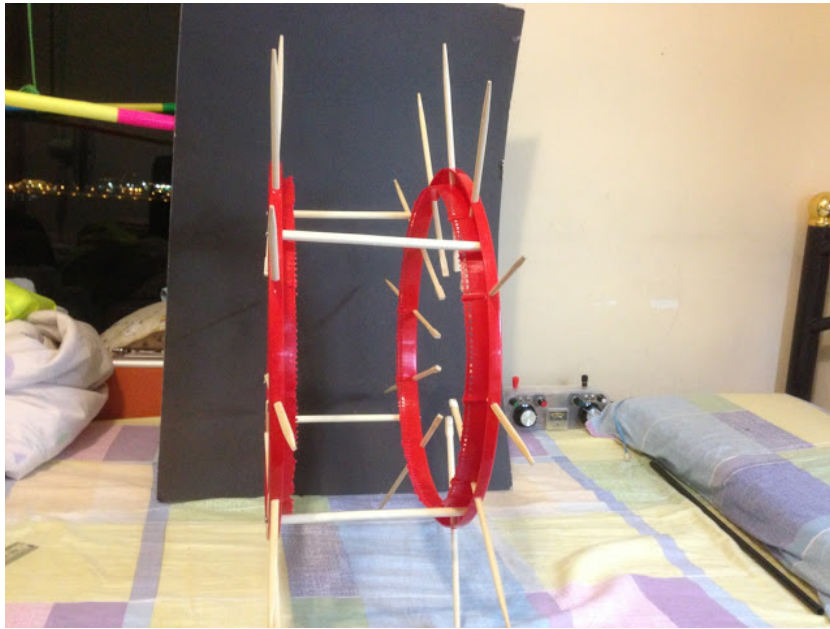
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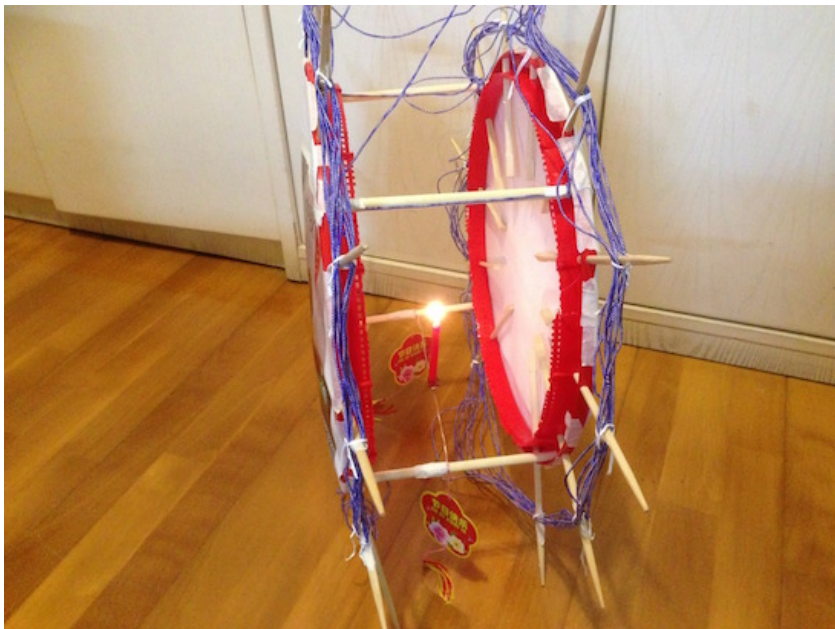
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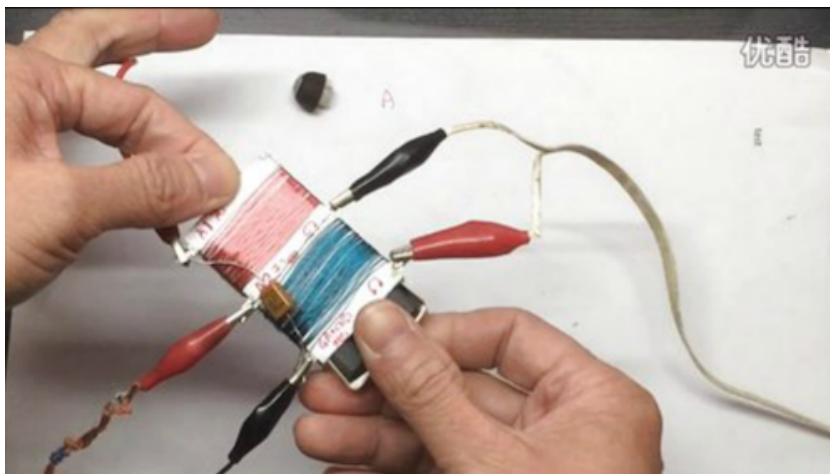
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Posted 26th September 2015 by [Billy](#)

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3rd September 2015

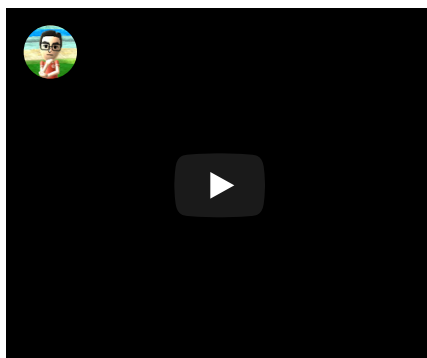
Match box crystal radio



[http://3.bp.blogspot.com/-dmlYfrM-g6U/VehkjPTgnzI/AAAAAAACDE/xTeA1_Ta93M/s1600/Screen%2BShot%2B2015-08-29%2Bat%2B8.06.00%2Bam.png]

Just made a match box radio using some short ferrite sticks.

Here is the testing video.



The radio is really easy to make. In the bear minimum, you just need the following:

1. A match box measured 60x35x10mm, or make one using cardboards yourself.
2. Magnet wires of AWG 27 or 0.3mm or similar thickness.
3. Any Germanium Diode (e.g. 1N34A, or 1N60, I used 1SS86).
4. Some solder lugs or you can use the paper clip as the connectors for antenna, earth, and earphones.
5. A pair of high impedance earphone or a crystal earbud.
6. A good outdoor antenna of 10 meters or above.
7. A good earth connection, e.g. connect to the water pipe or tap.
8. Fixed capacitor to match the coil for tuning: can be 100pf, 200pf or 300pf or omitted, value will be fixed during testing. Buy a few different fixed capacitor to test with.
9. Fixed capacitor of 2000pf, or can be omitted if your headphone is a crystal earbud.

How to make it:

1. Find a match box of 60x35x10mm,
2. Stick 3 solder lugs at the the left edge of the matchbox one at the top (A1), one at the middle (A2), one at the bottom (G).
3. Stick 2 solder lugs at the right edge of the matchbox, one at the middle (O1), one at the bottom (O2).
4. Put two or three small ferrite sticks (8 x 50 mm) inside the match box.
5. Wind the coils:
L1: tightly wind 38 turns of 0.3 Or 0.4mm Magnet wire starting from the top of the matchbox
L2: same as L1. wind on the same match box with a 5mm gap between L1 and L2
6. Solder L1, L2 and other components to the solder lugs as shown in the circuit diagram, except the variable capacitor C1. The value need to be tested before soldering that in.
7. Value of fixed capacitor C1 need to be tested to confirm, or can be completely omitted.
8. Fixed capacitor C2 can be omitted if you are using a crystal earbud.

Testing:

Connect the outdoor antenna to A1.

Connect the earth to G.

Connect the headphones to O1 and O2.

Slide the box holding the ferrite sticks inside the matchbox in and out of the matchbox to tune to a station. Try to replace the C1 or remove it to tune to the lowest AM/MW station possible (i.e. as close to 500khz as possible).

Next, connect the outdoor antenna to A2.

Try to replace the C1 or remove it to tune to the upper most AM/MW station possible (i.e. as close to 1500khz as possible).

Find a C1 value that will allow you to cover the best range, then solder it to the solder slug between A1 and G.

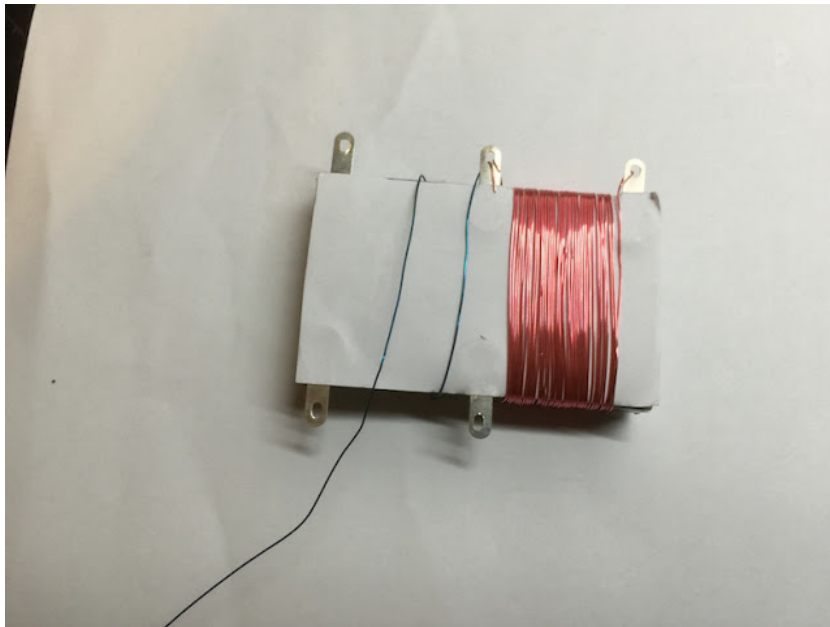
I used a pair of 150 ohm hearing aid earbud, after testing, I found the the performance of the radio is just as fine by omitting C1 and C2. Hence I removed C1 and C2 from my final circuit.

Reception for strong stations is good.

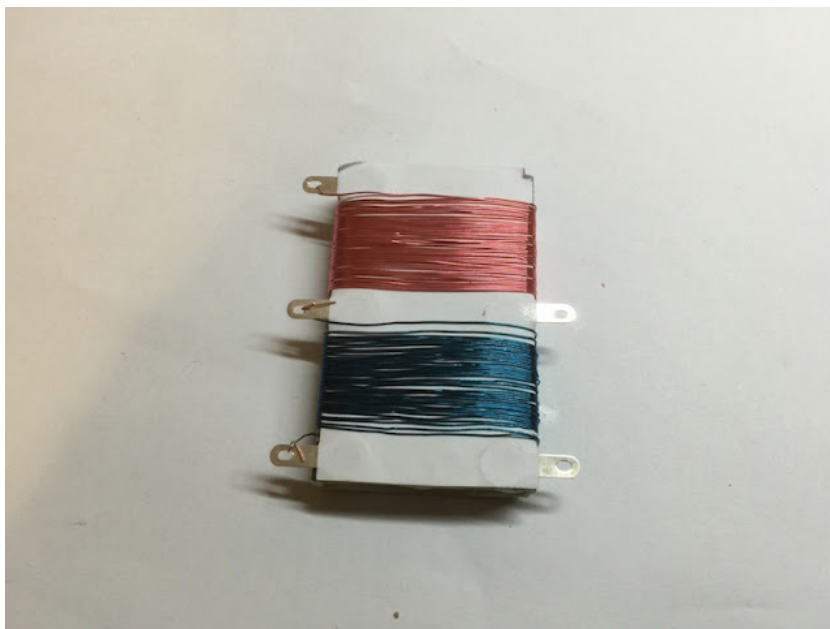
For waker stations that is too close to the strong stations, you have to add a wave trap connected in series between the outdoor antenna and the antenna input of the matchbox ratio to block the strong stations before you can get to the weaker ones.

The wave trap is just another tuning tank make from a coil and a variable capacitor.

Its function is to tune to the strong station that is blocking the weak station, so that signal is blocked from entering your crystal radio so the weaker stations can be heard.



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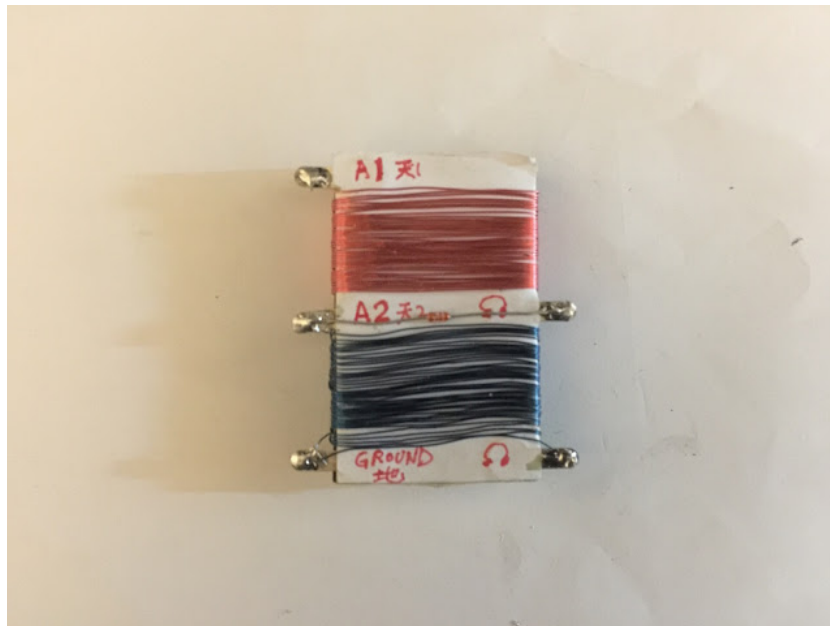
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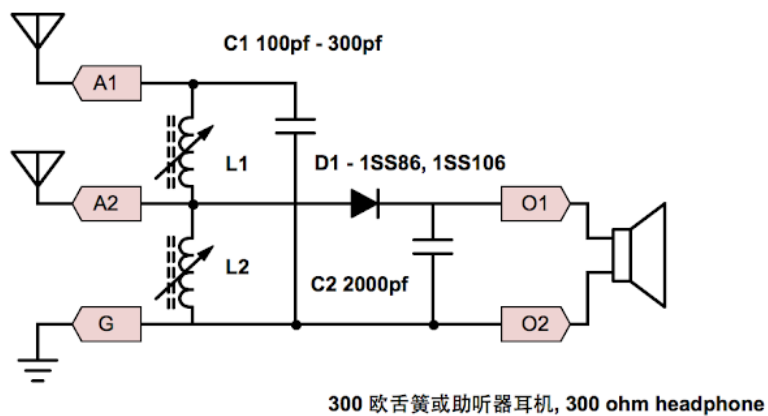
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火柴盒调感矿机 Matchbox Crystal Radio

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Posted 3rd September 2015 by Billy

2 View comments

3rd September 2015

230mm (9") Ferrite Sleeve Loop coil

I came across a post for FSL (Ferrite Sleeve Loop) - FSL Antenna Design Optimization , All-out Experimentation to Determine Weak-Signal Performance Potential By Gary DeBock, Puyallup, WA, USA March 2012
<http://www.am-dx.com/antennas/FSL%20Antenna%20Design%20Optimization.htm> [\[http://www.am-dx.com/antennas/FSL%20Antenna%20Design%20Optimization.htm\]](http://www.am-dx.com/antennas/FSL%20Antenna%20Design%20Optimization.htm)

I was eager to find out if this is a way to create loops that can have the same sensitivity as a much better loop antenna without ferrite cores. If so, this will be a good way to shrink the loops to make smaller crystal radios with the same or even better sensitivity.

I started following the instruction and twist it a bit to work with what I have at home.

I purchased some cheap ferrite sticks with unknown permeability. Since I cannot find the 10x200mm ones, I purchased the 10x100mm ferrite sticks which is much cheaper (@ 51 RMB for a 100 pieces equivalent to US\$8.03). I intend to connect two of these together to make a 10x200mm ferrite sticks. I end up purchasing 200 pieces. This will allow me to make a FSL with a perimeter of 10x100mm = 1 meter. Diameter of 310mm.

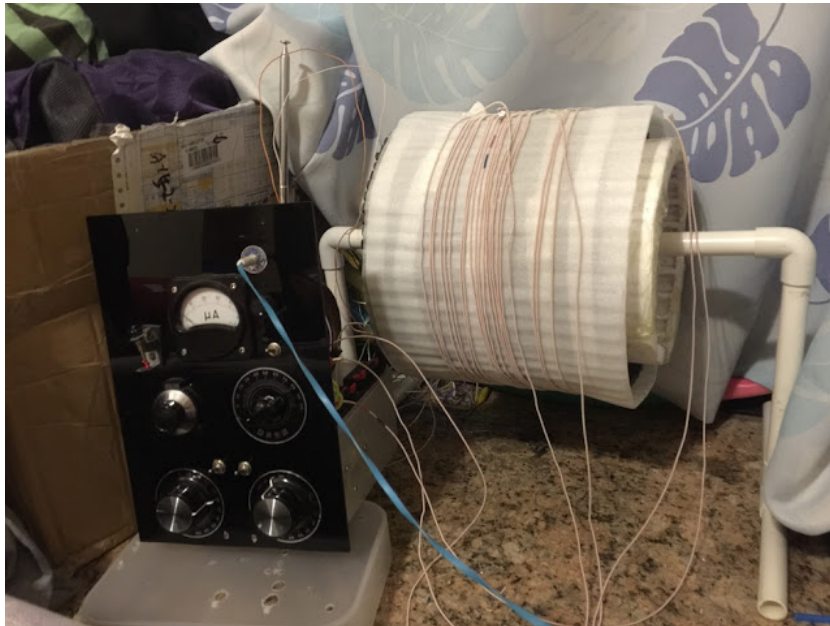
I ended up making one with the diameter of 230mm or 9".

I started with a round plastic container for noodles then wrap multiple layers of foam onto it. Finally use adhesive tapes to stick the 170 ferrite sticks into position as close enough to one another without any gaps.

Then wrap another layer of thin foam, before winding 20 turns of 0.04x660 litz wires to form the coil for the tuning tank, another 2 turns for MOS FET output.



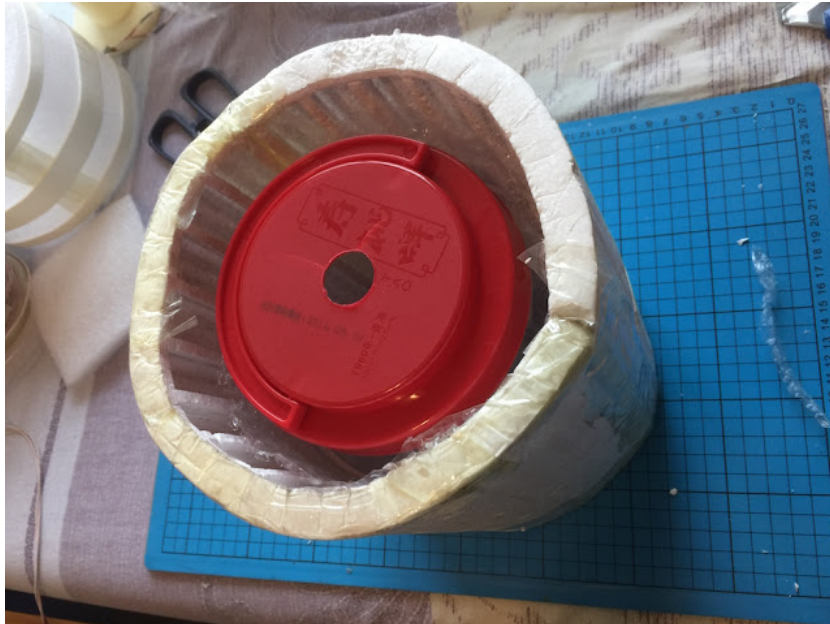
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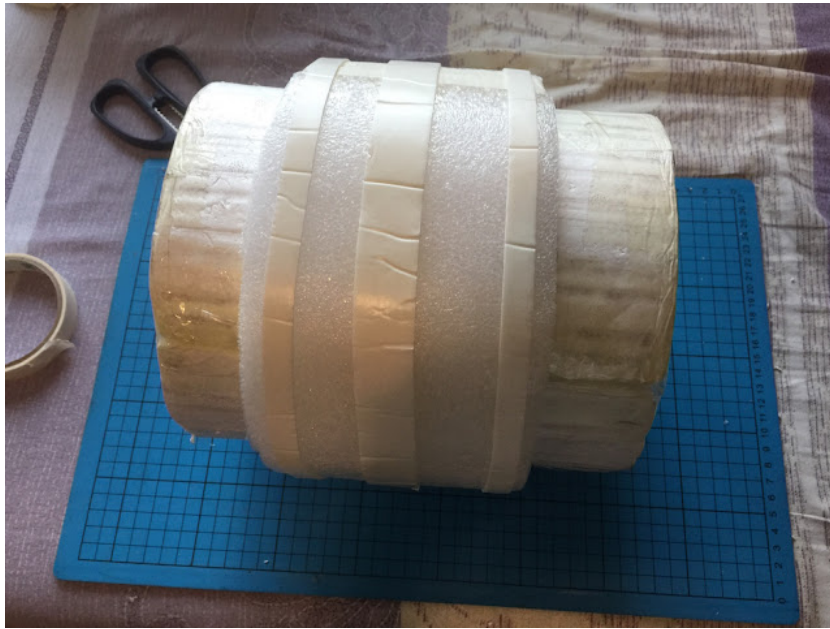
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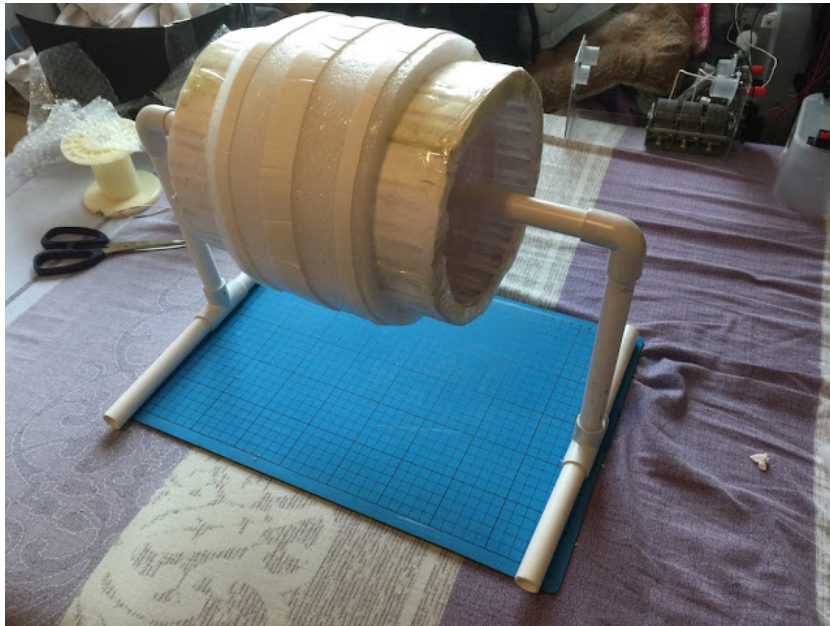
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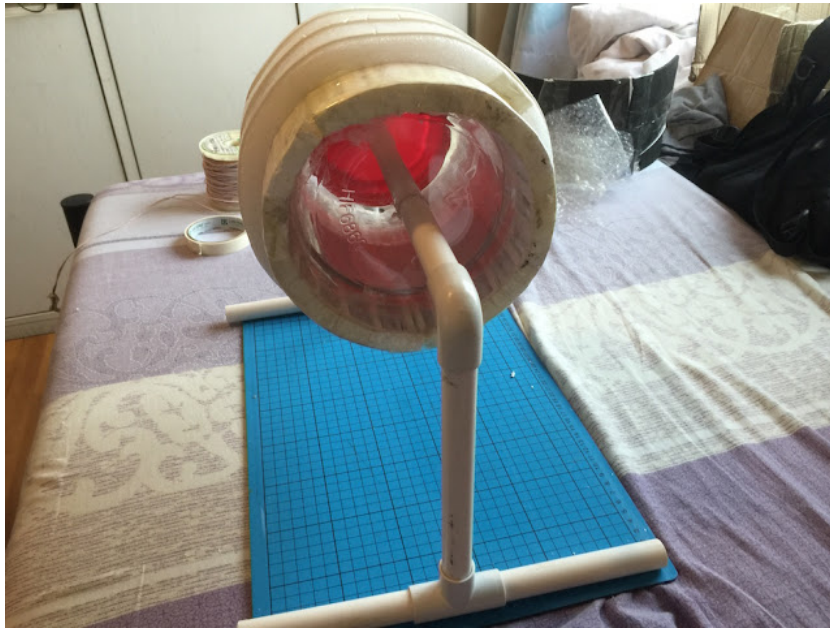
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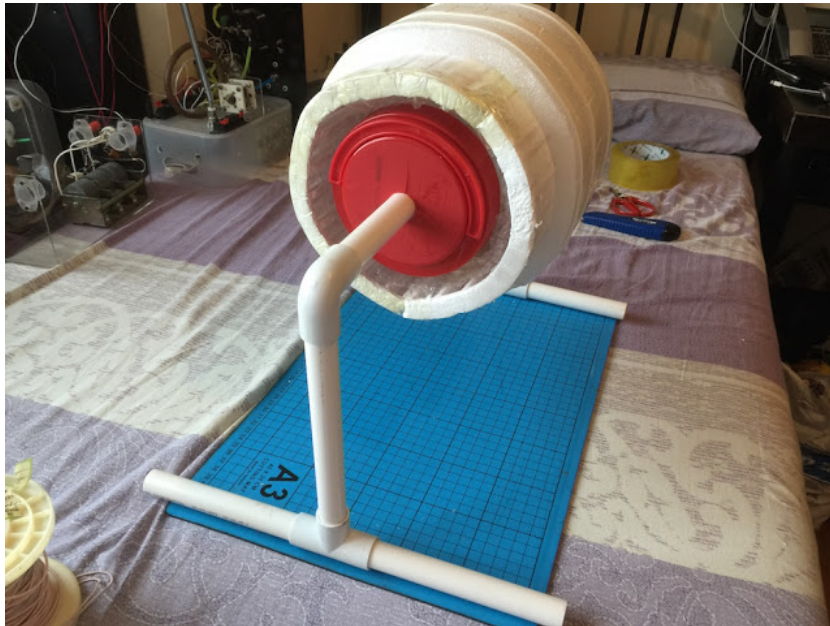
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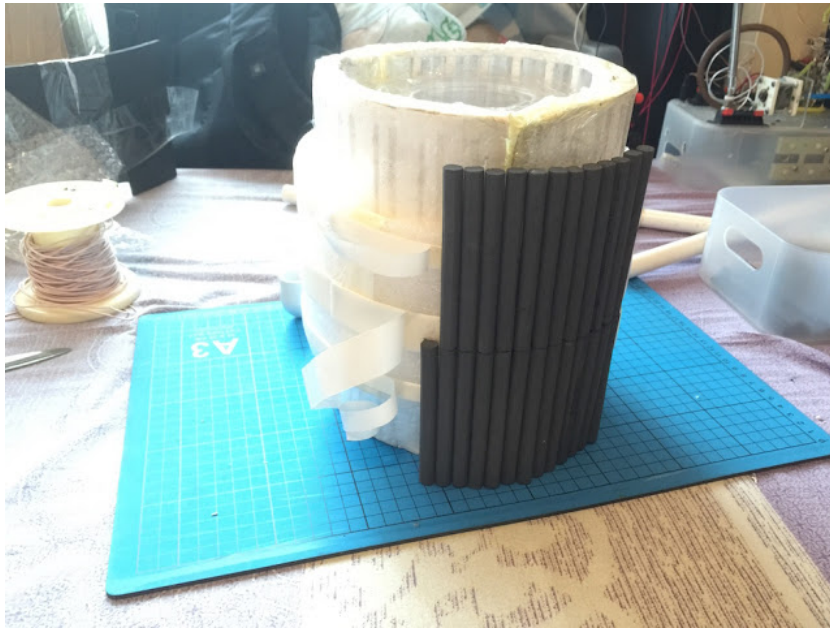
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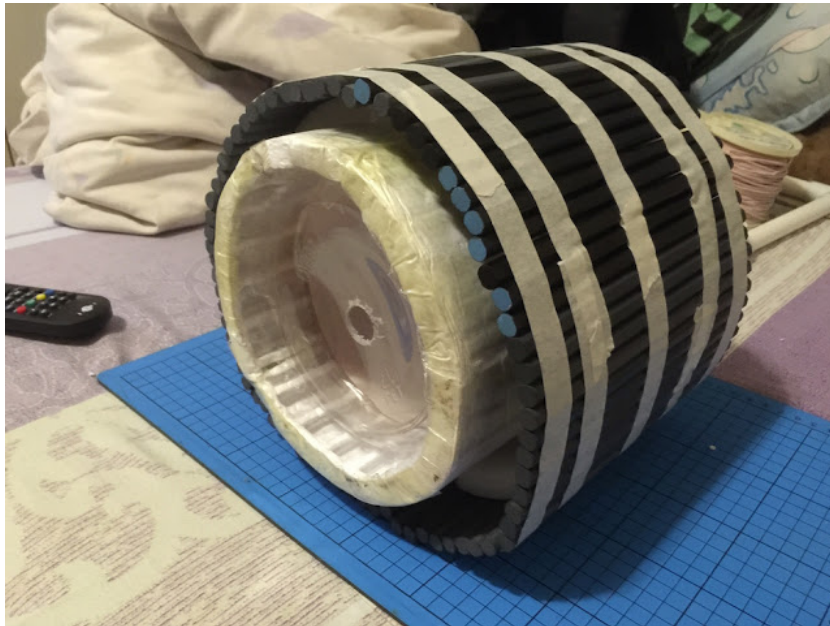
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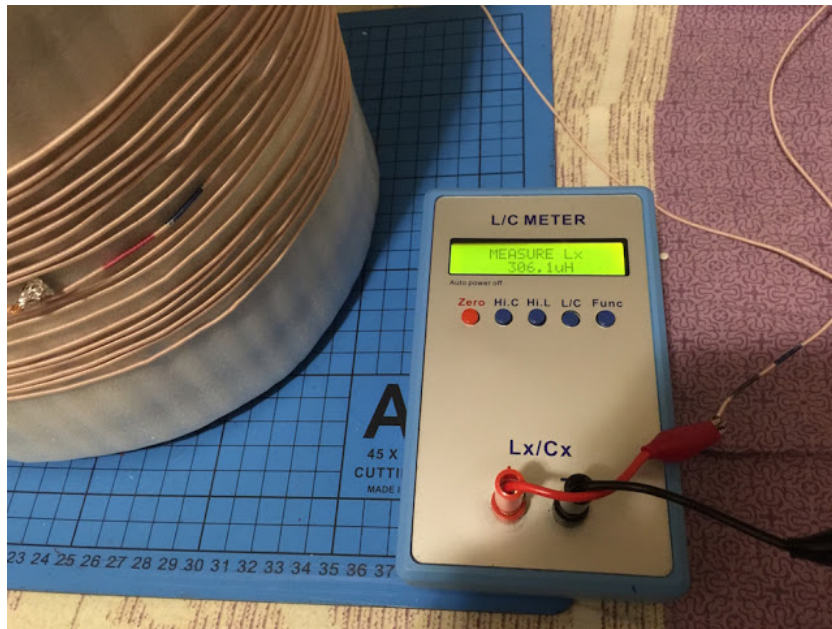
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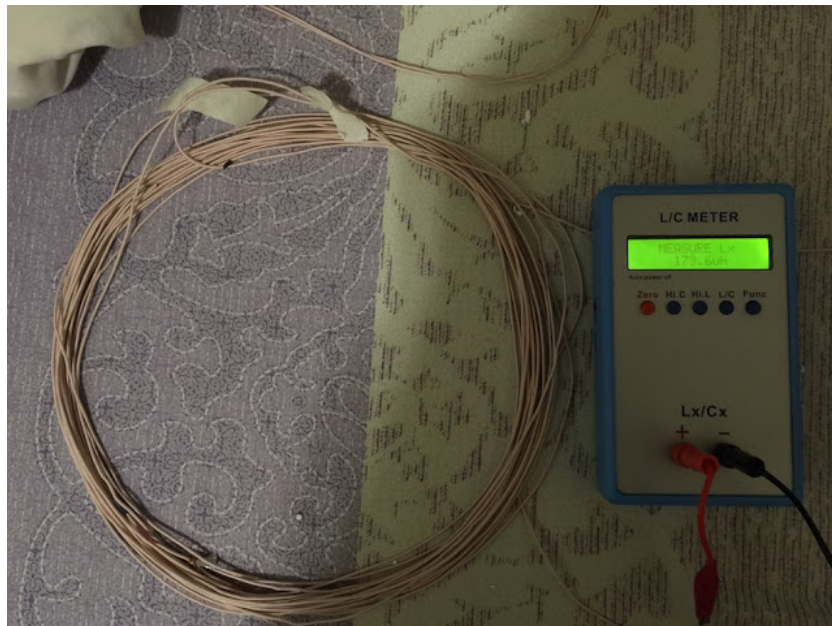
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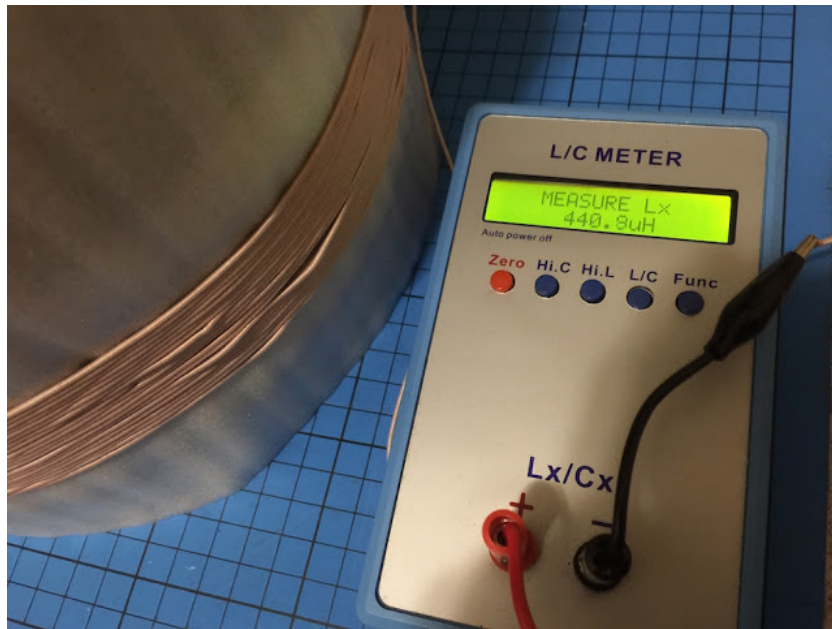
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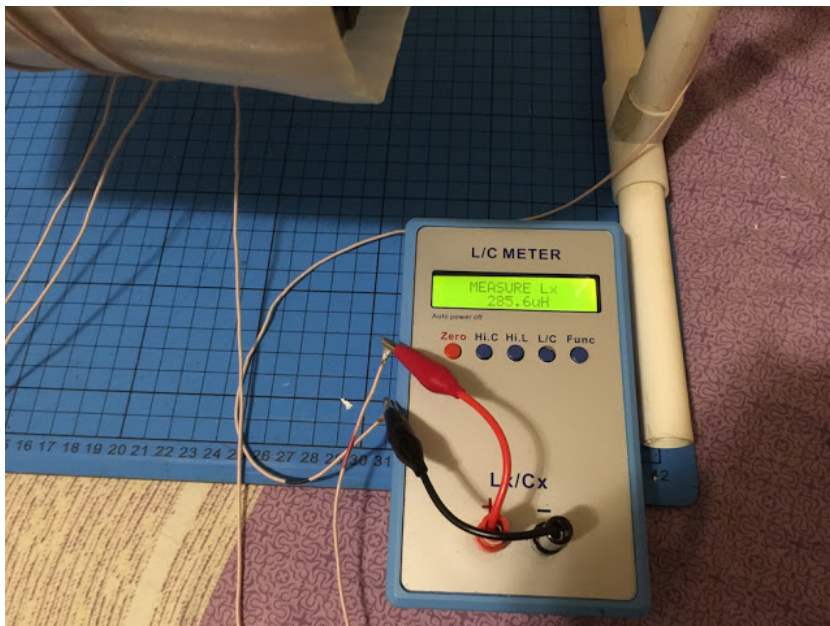
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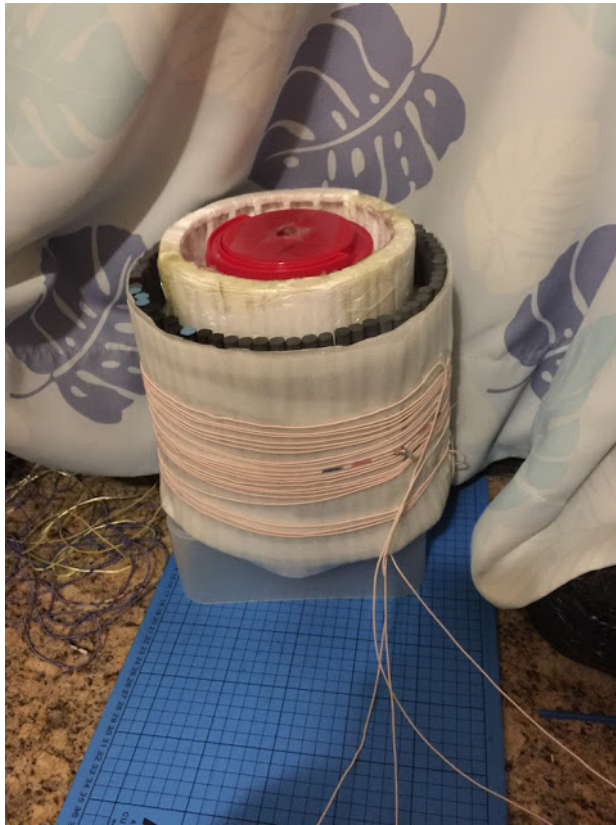
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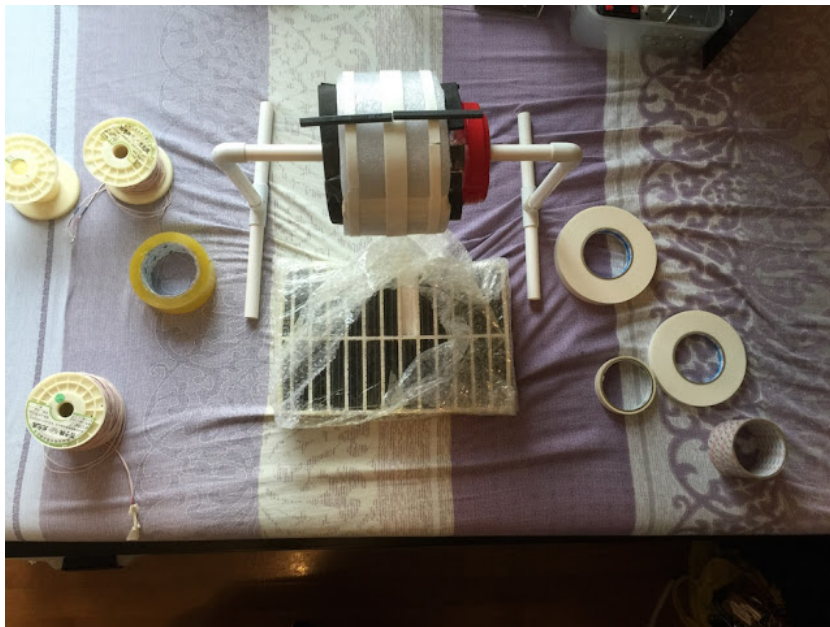
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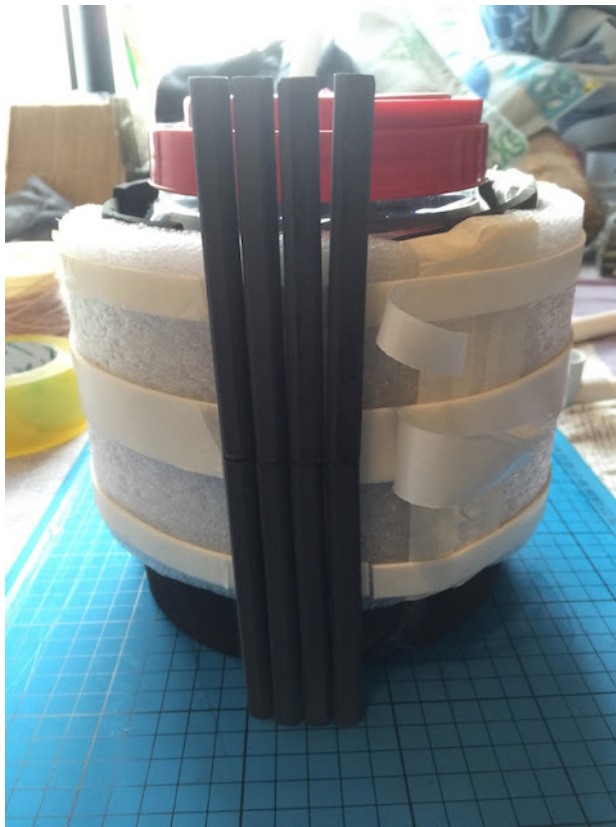
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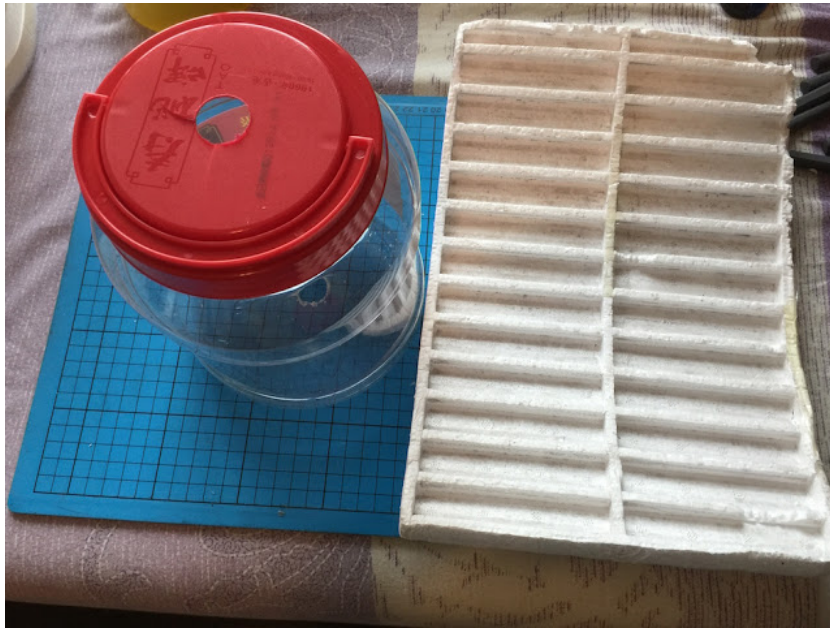
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[http://3.bp.blogspot.com/-Uq1YyrfzxWk/VehalvPZWI/AAAAAAAAAB8s/GAPQMnT44yg/s1600/IMG_2664.JPG]

I was amazed when I hook it up to the air variable capacity and the MOS FET. Without the ferrite stick, an air loop that size will only produce very tiny output that is just audible. With the ferrite stick sleeve, the FSLe produced doubled output volume.

Next is to compare this with the other bigger air loops to find out what sized air loops will have the same sensitivity as the FSL.

Testing is not easy as the sensitivity of the reception varies throughout the day. My place is close to the airport, and every 10 minutes, a plane will literally fly over the top my 60 storey building (may be 1000 meter above), that did have some impact to the reception of crystal radio. I am also trying to find a measurable unit that can give a true comparison. For example, I tried measuring the voltage across the terminals of the audio output without the headphone. I also tried measuring the output current level. But I found that peak dc voltage, or peak dc current does not mean the loudest audio output. I do not have a high frequency AC Voltmeter or db meter, so cannot get much out of this.

Next, I tried to use some iPhone software that can measure the audio level in decibels. This seems to work quite well. I have created a device that can connect the earbud of my 2x150 ohm hearing aid earphone into the mic of the iPhone without much gaps.

Dynamic Views theme. Powered by [Blogger](#).

Then the software will pickup the audio signal form the mic and workout the peak output level.
By comparing the peak output level (db), I will be able to compare the sensitivity of different crystal radios objectively.



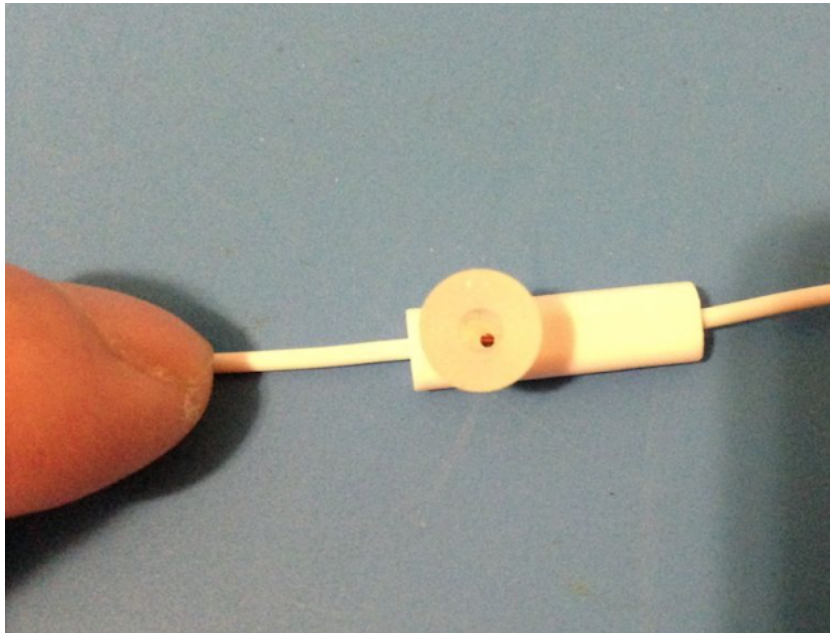
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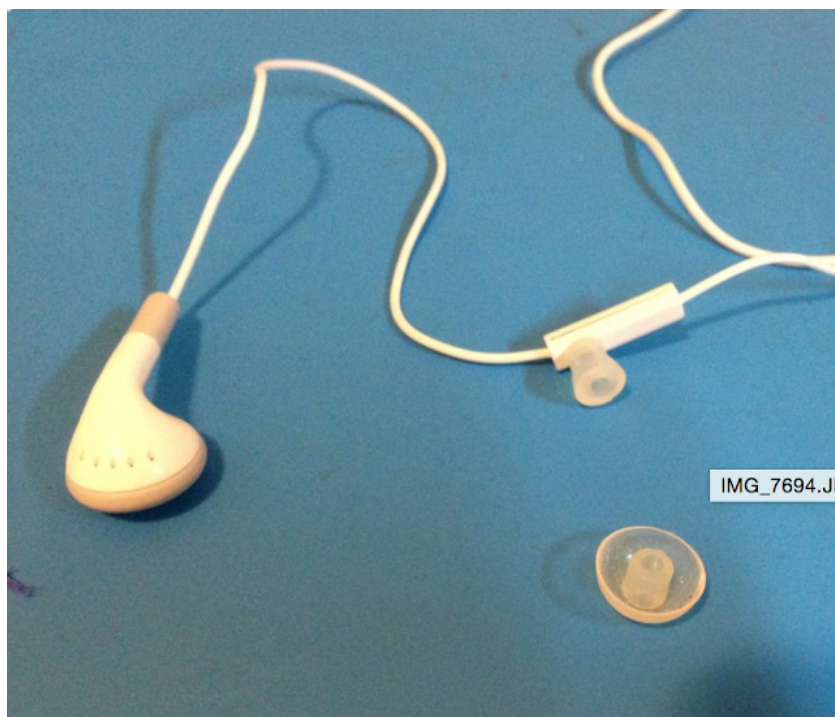
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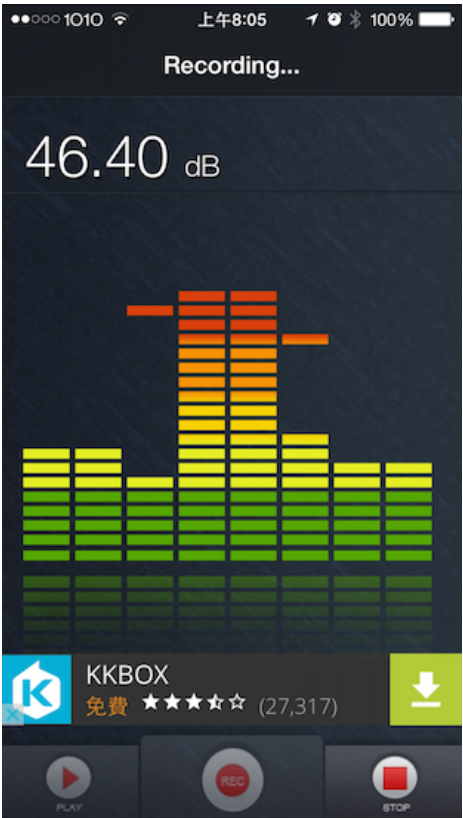
There are multiple free db meter software on App Store. I found the measured value of the same audio level from different software varies a bit. In the worst case the variance can be +/-50 % when you try to measure the same audio output with different software.



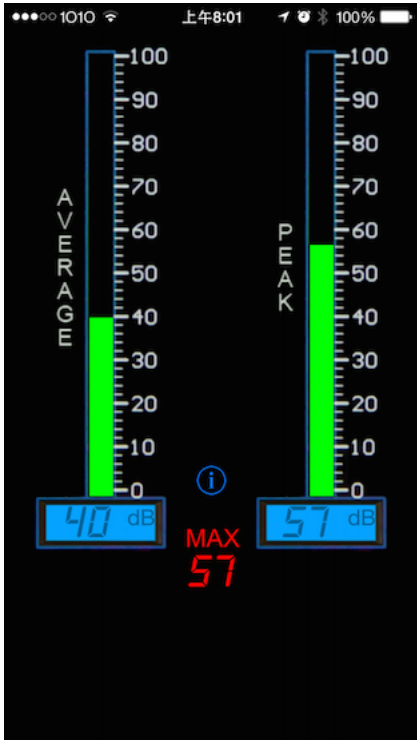
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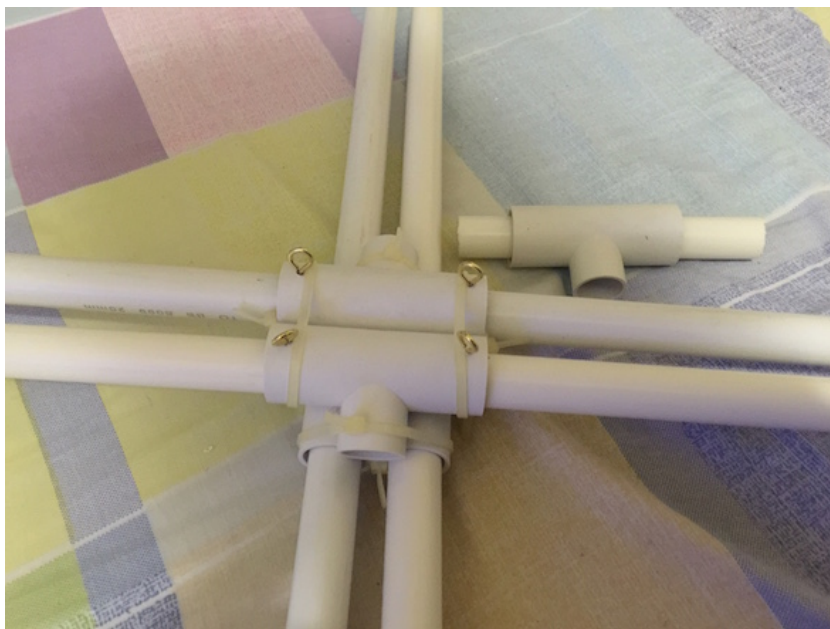
I also made an extensible frame to allow me to adjust the size of the air loop that can be used to compare with the FSL. I hope to find out what size Air loop will have the same sensitivity as the FSL.



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[http://3.bp.blogspot.com/-M8a1IMKF2Us/VehatrX6xaI/AAAAAAAAACAE/vPoxRHU3Ulk/s1600/IMG_2774.JPG]

Once I prove that FSL is really worth the effort and money, I may upgrade my 9" 230mm diameter FSL to 12" diameter (330mm wide).

Posted 3rd September 2015 by [Billy](#)

1 View comments



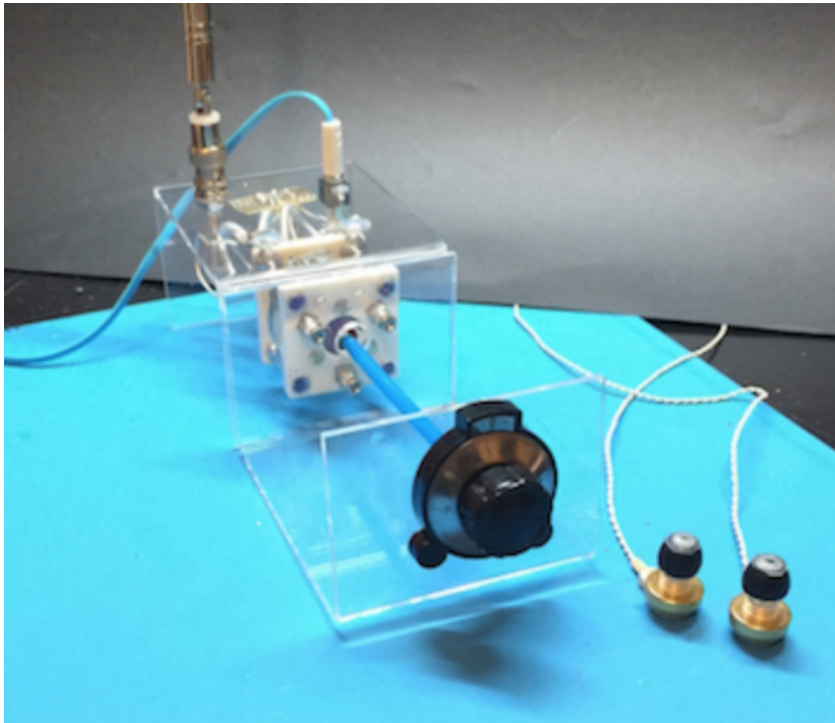
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1st September 2015

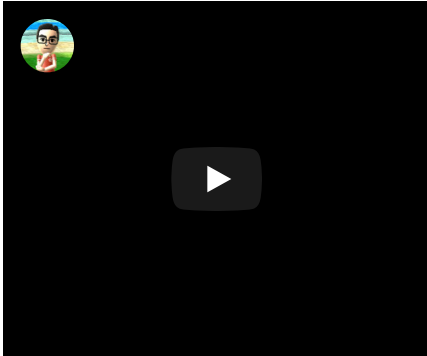
I won an award at the 6th Crystal Radio DIY contest

I am very happy to win the award at the 6th Crystal Radio DIY contest in China.



[<http://4.bp.blogspot.com/-QPfI3iCBvM/VeXAFs5zXZI/AAAAAAAAAB70/OqjQd4ouGGo/s1600/Screen%2BShot%2B2015-09-01%2Bat%2B11.10.12%2Bpm.png>]

Video Link



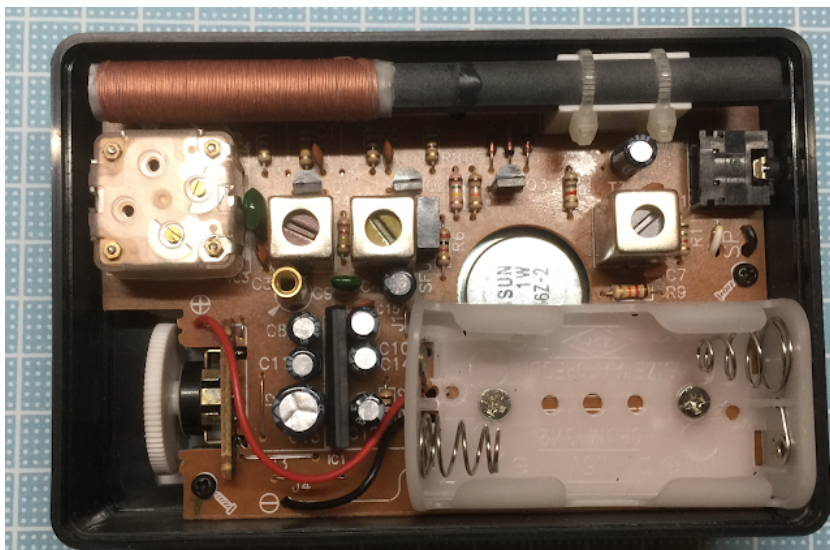
Here is the prize and award certificates.



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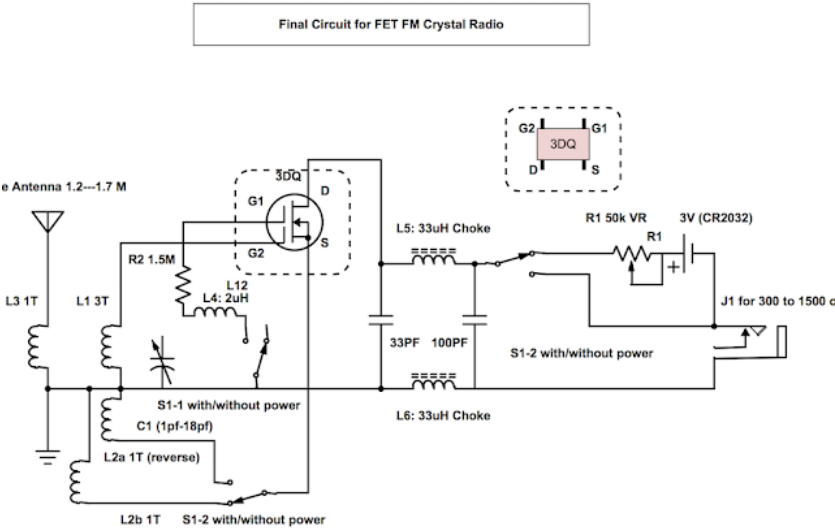
My post can be found here:

The Chinese version here.

<http://www.crystalradio.cn/thread-625705-1-1.html>

An english version here

<http://theradioboard.com/rb/viewtopic.php?f=2&t=6088>



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L1 using 2mm silver plated copper wire to wind 3 turns with a diameter of 25mm

L2a using 1mm silver plated copper wire to wind 1 turn in opposite direction as L1. with a diameter of 25mm

L2b same as L2a but wind 1 turn in same direction as L1.

L3 same as L2b.

L4 2uH Choke, can be DIY using 1.5M 1/4W resistor as the core, wind 30 turns using 0.07 to 0.1mm insulated copper wire.

L5, L6 33uH Choke, can be DIY using 1.5M 1W resistor as the core, wind 100 turns using 0.07mm insulated copper wire.

C1 Silver plated butterfly air variable capacitor (1pf-18pf) or other similar variable capacitor

J1 for 300 to 1500 ohm headphone

Posted 1st September 2015 by Billy

0 Add a comment

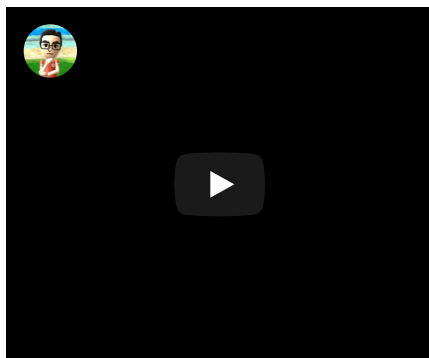
29th July 2015

Crystal Radio Tests in Tokyo

I just visited Tokyo and brought my umbrella crystal radio for AM reception, and my FM crystal radio for FM reception. Both the AM and FM crystal radios picked up a few local stations with strong signals.

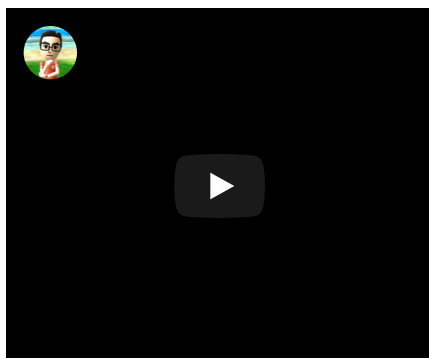
I also visited Akihabara and bought a crystal radio earbud and another 1000 ohm hearing aid like ear bud.

AM Radio test



<https://www.youtube.com/watch?v=ESitUNSQBdE> [<https://www.youtube.com/watch?v=ESitUNSQBdE>]

FM Radio test



<https://www.youtube.com/watch?v=zFnlmwYf1M> [<https://www.youtube.com/watch?v=zFnlmwYf1M>]

Here are some photos from Akihabara.



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Posted 29th July 2015 by Billy

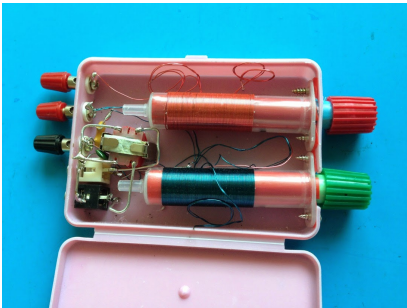
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8th August 2014

My blog [<http://www.crystalradio.cn/forum.php?mod=viewthread&tid=579221&highlight=>] [<https://www.blogger.com/blogger.g?blogID=231164414182542235>]

My other blog articles

My blog



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转发：小收音机：仅1根纳米管可嵌入细胞 [http://www.crystalradio.cn/thread-582873-1-1.html]	<div>≡ 矿石机技术区</div> <div>≡</div> <div>[http://www.crystalradio.cn/forum-3-1.html]</div>	<div>loveoldpc [http://www.crystalradio.cn/home.php][http://www.crystalradio.cn/home.php?mod=space&username=loveoldpc]</div> <div>13 4 天 前</div> <div>582873-1-1.html</div> <div>190</div> <div>[http://www.crystalradio.cn/forum.php?mod=redirect&tid=582873&goto=lastpost#lastpost]</div>
移动磁棒调台的针筒矿机 [http://www.crystalradio.cn/thread-582382-1-1.html]	<div>≡ 矿石机技术区</div> <div>≡</div> <div>[http://www.crystalradio.cn/forum-3-1.html]</div>	<div>cheungbx [http://www.crystalradio.cn/home.php][http://www.crystalradio.cn/home.php?mod=space&username=cheungbx]</div> <div>37 半 小 时 前</div> <div>582382-1-1.html</div> <div>534</div> <div>[http://www.crystalradio.cn/forum.php?mod=redirect&tid=582382&goto=lastpost#lastpost]</div>
针筒调感式矿机 [http://www.crystalradio.cn/thread-581679-1-1.html]	<div>≡ 矿石机技术区</div> <div>≡</div> <div>[http://www.crystalradio.cn/forum-3-1.html]</div>	<div>cheungbx [http://www.crystalradio.cn/home.php][http://www.crystalradio.cn/home.php?mod=space&username=cheungbx]</div> <div>25 7 天 前</div> <div>581679-1-1.html</div> <div>617</div> <div>[http://www.crystalradio.cn/forum.php?mod=redirect&tid=581679&goto=lastpost#lastpost]</div>

[http://www.crystalradio.cn/forum-3-1.html]

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[http://www.crystalradio.cn/forum-3-1.html] 4879
[http://www.crystalradio.cn/forum-3-1.html] mod=redirect&tid=389699&goto=lastpost#lastpost

Posted 8th August 2014 by Billy

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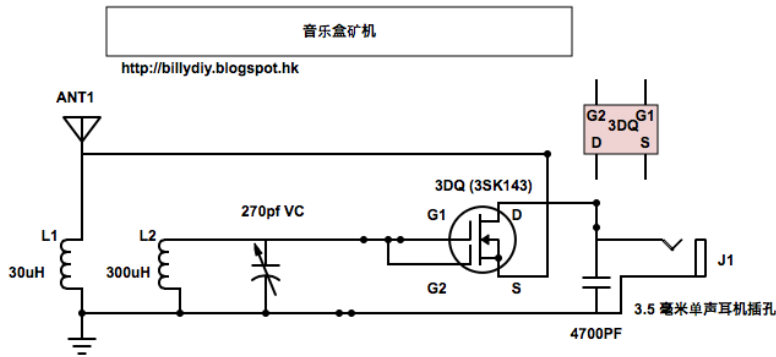
30th April 2014

My Crystal Radios

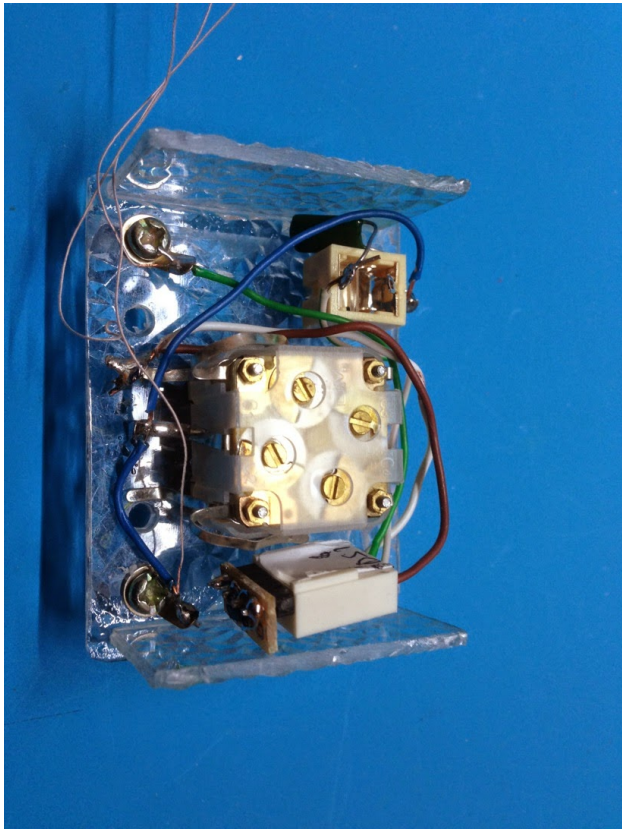
My Crystal Radios



[http://1.bp.blogspot.com/-p1dMQBrjztA/U2EiFxxefv/AAAAAAAAABQl/jptO1nD6R9w/s1600/IMG_6461.JPG]



[<http://2.bp.blogspot.com/-IASIH1QpBhc/U2EiPuCFjDI/AAAAAAAAABqc/oMu2ZfomjjA/s1600/Circuit+Diagram.png>]



[http://4.bp.blogspot.com/-vq6rMk-1730/U2EiJWvBUI/AAAAAAAAABqQ/H_B8W4quwig/s1600/IMG_6458.JPG]

Do you know that you can listen to radio without battery ? I am holding such a radio in my hand now. It's all powered by the radio energy.

I am going to share with you how I enjoyed my hobby - making crystal radios. We'll explore what is a crystal radio, how to make one, and how you can benefit from this hobby.

When I was 10 years old, I was attracted to an article about a magical radio that worked without battery. I saved a few dollars, bought some electronic components and tried to make one. To my disappointment, I could failed. At that time, there is no one to ask or talk to. And I have to drop this hobby.

Last year, a youtube video about a special powerless radio caught my attention. I decided to re-do what I failed to do when I was a kid. I found a forum on the internet hosted in China called crystalradio.cn. After a lot of research and consulting people on the forum, I started making my first Crystal radio. I was overjoyed and could not sleep that night when I heard the the radio broadcast. Today, I have made more than 20 Crystal radios. As small as a pencil, and as big as a Hula Loop. I even took part in the annual crystal radio DIY contest. My creation got into the second round, and ranked #12 of all the 40 submissions.

Now, let's see how a Crystal Radio works.

In the old days, Radios were big and expansive. They consume a lot of power as the vacuum tubes inside are big and hot. Then someone replaced the vacuum tubes with much smaller crystals. Not only smaller, these radio can also work without battery. By just harvesting the radio energy, you can listen to a radio broadcast using a head phone. When the signal is exceptionally strong, it can even drive a loud speaker. One other benefit is that as there is no amplification, you can listen to the original sound without distortion.

As technology advanced, crystals were replaced by a electronic component called diodes.

You might now want to know how can you make a crystal radio ?

The simplest crystal radio is made up of 4 components: an antenna, a ground connection, a crystal or diode, and a headphone. This type of radio can only receive a single station as it cannot be tuned.

To add the tuning capacity, you can add a coil, a tuner (or capacitor). The tuner and the coil together allow you to tune to the station that resonant with a certain frequency.

There are two types of crystal radios:

The fixed crystal radios, and the portable crystal radios.

Fixed crystal radios need a long antenna (10 meters or above), and a connection to the ground (your water pipe), to compensate for the smaller coil. The signal will be much stronger than the portable one.

For example, these ones on the table are fixed crystal radios.

I have the tiny crystal radio, a super crystal radio that can receive medium wave and short wave, and the big crystal radio.

Portable crystal radios do away with the long antenna and the ground so you can walk freely with the radio.

To compensate for the lack of a long antenna, you need a bigger coil, at least half a meter in diameter.

Look at these, they are portable crystal radios. I can bring them to the street and listen to the radio.

I have the umbrella crystal radio, the hula loop crystal radio, the hat radio, the filing cabinet radio.

This one is a wearable crystal radio.

One thing I must tell you.

If you try to get on a plane with this on you'll be treated very specially, like a terrorist.

Feel free to try one of these crystal radios.

You can also refer to these links if you are interested to make one.

www.crystalradio.cn

billydiy.blogspot.hk

I find that having a hobby made my life complete. In the past, I just spent my spare time watching TV or films. It's a good thing to relax. However, I find that I enjoy creating things more. Making crystal radio satisfy my inner drive of creativity. It also gave me the stamina to focus on my job.

Do you have a hobby ? If not, I hope you can find one and enjoy it like I do.

Posted 30th April 2014 by Billy

1 View comments

4th January 2014

百变简易大环矿石收音机

这是一个或多个由超薄的印字机排线当线圈,和3DQ检波器组成的多用途,多效果的无天地线大环矿石收音机。电路是典型的3DQ检波电路,配合270pf 双联可变电容及利用超薄大环的不同搭配,做出多用途,多效果的百变无电源收音机组合。



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大环的主要材料：

用到一种薄薄的印字机排线，在电子令件店有售，，约20元一米，可以做个大环，可用作矿石收音机的线圈，效果还不下于用电线或漆包铜线绕的大环。此排线由1毫文的铜箔

做成，表面面积大，能改善趋肤效应带来的影响。铜片与铜片间距1.5毫米，减少邻近效应，分布电容。测试后发觉比用电脑排线好，响度加大了。

多效果：利用排线插头交错对接来做出“单股单回路”，或把把每两个排线交错对接，把邻近两个铜箔

一起做个双股线圈来做个“双股单回路”，捕捉多一些电波，增强接收效果。也可做个双回路来增强选择性。可以用一个排线的“单环双回路”或用两个排线的“双环双回路”。

更可做个双环增强回路：用两大环来增强3DQ的能量来增强输出。

多用途：大环矿机：利用排线插座和插头，这大环可打开，可闭合，方便穿进其他支架上，

例如可轻易穿进雨伞骨内做成雨伞矿机。



[http://1.bp.blogspot.com/-hoVRDP1ypwE/UsfGdNML12I/AAAAAAABmY/7Iy4VHRLrB8/s1600/IMG_5213.JPG]



[http://4.bp.blogspot.com/-okxpqY2otl8/UsfGdq3Gdcl/AAAAAAABmg/4vOJIGhYmMA/s1600/IMG_5214.JPG]

也可挂在窗户旁，当个室内无天线矿机，



[http://1.bp.blogspot.com/-4-CZKOQ4tWI/UsfGWB6r4TI/AAAAAAAAABjw/alxyiOVAJGs/s1600/IMG_5096.JPG]

更可做个小一点的大环，把它折成方形，发挥你的想像力，做出不同用法的无天地线的矿石收音机：放上帽子边，做个帽子矿机



[http://2.bp.blogspot.com/-9Tq6fL7IPQI/UsfGV0m00sI/AAAAAAAAABjk/7uRCQu9ebNQ/s1600/IMG_5094.JPG]

放入背包内，做个背包矿机，



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[http://2.bp.blogspot.com/-cw-78zBvXj4/UsfGZYJV1zl/AAAAAAAAABk4/SRSozHBUGWs/s1600/IMG_5106.JPG]



[http://1.bp.blogspot.com/-ftaBsa8aHQU/UsfGZkd75-I/AAAAAAAAABIA/17rseky6hrE/s1600/IMG_5108.JPG]

放入马甲内，做个马甲矿机，



[http://4.bp.blogspot.com/-TFGyloqWfIs/UsfGjcUFGKI/AAAAAAAAABos/38-SgwwPOYE/s1600/IMG_5279.JPG]



[http://1.bp.blogspot.com/-5VGLAC9tL8Q/UsfGjxGriKI/AAAAAAAAABoo/0PBvhxWPOro/s1600/IMG_5280.JPG]

放入文件匣内，做个文件匣矿机。



[http://4.bp.blogspot.com/-wEhQcrpVGrQ/UsfGaG7tNfI/AAAAAAAAABIM/CBjW1VFUloY/s1600/IMG_5109.JPG]



[http://4.bp.blogspot.com/-0PJauwFuibA/UsfGadZ9PLI/AAAAAAAAABlg/bseYI4fdt_U/s1600/IMG_5110.JPG]

做法:

线圈:

找一段印字机用的薄排线(24芯或以), 如买不到,可用电脑彩虹排线代替.

长度是乎用途, 如做雨伞矿机或室内大环用2.8米长的排线.

如做帽子,背包,马甲,文件匣, 用1.2米长的排线.

先用烙铁把排线上的塑料熔去,露出铜片.再把排线的一端焊接到一个26针排针上, 另一端焊接到一个26针排线插上再把它焊接到另一个26针排针上。(如用彩虹排线, 因彩虹排线的间距离较密, 要把两条线当一条线接)。



[<http://4.bp.blogspot.com/-28bVQ0Z4G-w/UsfGIdoFOpl/AAAAAAAAABpl/17PeHg9Kg6E/s1600/Screen+Shot+2013-10-14+at+6.24.37+PM.png>]



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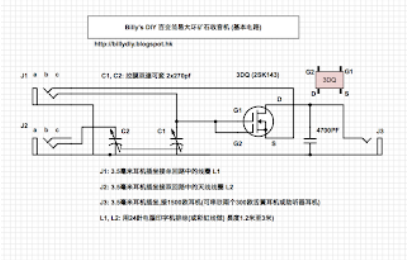
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排线插坐和排针是用来把大环的每一圈交错对接和把大环闭合。另一排针是用来做抽头，可匹配阻抗，又可改变波段去收听中波及短波广播。

电路：



[http://4.bp.blogspot.com/-WsEjXrwUFYM/UsfGSe8Ow9I/AAAAAAAAABiQ/iq2Ha6hX6jQ/s1600/Circuit+Diagram+1.png]

电路是典型的3DQ检波电路，调谐线圈L1 由插座J1连接,天线线圈L2 由插座J2连接。

不同的组合可做出不同的电路和效果。

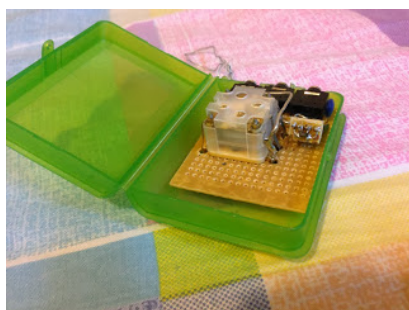
参照电路图,把所有部件包括3dq, 可变电容，线圈插座J1,J2,耳机插座J3等直接焊接到一小洞洞板上.再装进塑料盒子内。



[http://1.bp.blogspot.com/-ONai7jeqyFU/UsfGgyr5OtI/AAAAAAAAABno/juyVz8y3U6E/s1600/IMG_5270.JPG]



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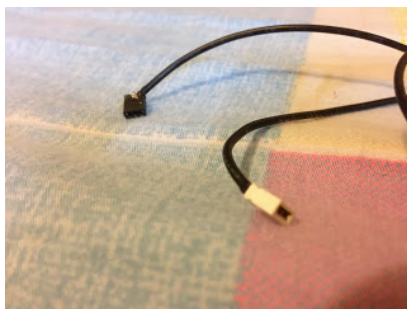


[http://3.bp.blogspot.com/-E6oa0CIBCcw/UsfGh5cCWKI/AAAAAAAABoM/cs8pJLp_Px8/s1600/IMG_5274.JPG]

把J1,J2接上不同颜色的两脚jumper来插进线圈抽头的排针上。接线插可把两个排针接在一起来做成多种组合：



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[http://4.bp.blogspot.com/-

moXA9ynykz8/UsfGi16d9SI/AAAAAAAAABo0/Hv5t8ZJk9mU/s1600/IMG_5277.JPG]

J1-黑色 jumper-接L1线圈地端

J1-红色 jumper-接L1线圈热端

J1-黄色 jumper-接3DQ源极线圈

J2-黑色 jumper-接L2线圈地端

J2-白色 jumper-接L2线圈热端

排线大环的不同组合:

单股单回路:

如做2.8米长的大环,可做阳台上的户内矿机

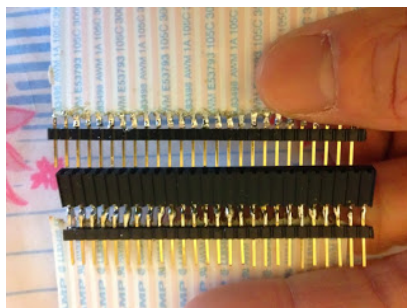
如做1.2米长的小大环可用于帽子, 背包, 马甲, 文件匣矿机等:



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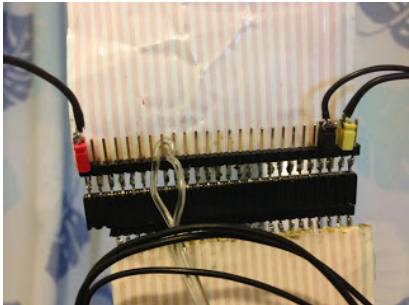
CZKOQ4tWI/UsfGWB6r4TI/AAAAAAAAABjw/alxyiOVAJGs/s1600/IMG_5096.JPG]

把排针交错插进排线插座上, 例如排针的第一针插进排线插座的第二洞内, 第二针插进插座的第三洞内, ...,第廿三针插进插座的第廿四洞内.



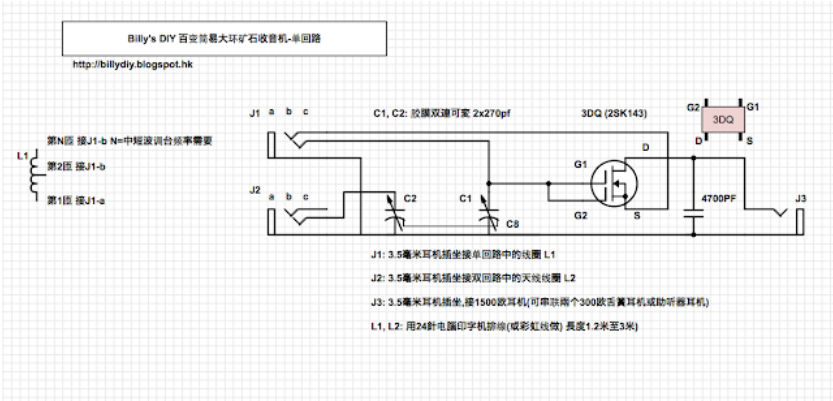
[http://3.bp.blogspot.com/-

- 再把J1-黄色jumper的其中一脚插到大环的第1匝的排针上
- 把J1-黑色jumper的其中一脚插到大环的第2匝的排针上
- 把J1-红色jumper的其中一脚插到大环的第24匝的排针上
- 这便可把排线的每一线连成大环中的每一匝, 做成一个廿四匝的大环.
- 接L1线圈地端
- J1-红色-接L1线圈
- 再把J1J1-黄色-接3DQ源极线圈
- J2-黑色-接L2线圈地端
- J2-白色-接L2线圈



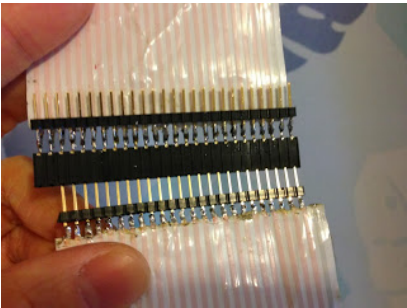
[http://3.bp.blogspot.com/-EpvOw2N4JoY/UsfGXaiYQYI/AAAAAAABkM/nDsYNdrxhm0/s1600/IMG_5101.JPG]

双股单回路:

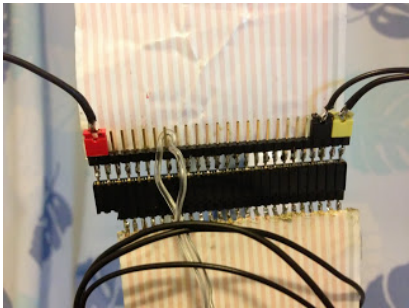


[<http://4.bp.blogspot.com/-VDWlp1wp4EM/UsfGSWgcOil/AAAAAAABiY/C7X23p1w-ks/s1600/Circuit+Diagram+2.png>]

可用于2.8米长的大环。



[http://2.bp.blogspot.com/-XOO7T-oHdDs/UsfGXwlc0oI/AAAAAAABkY/mvXKxZrWp-8/s1600/IMG_5102.JPG]



[http://4.bp.blogspot.com/-LvTNC6j4zo8/UsfGXUj7nnI/AAAAAAAAABkE/h0AfoCmdhgY/s1600/IMG_5100.JPG]

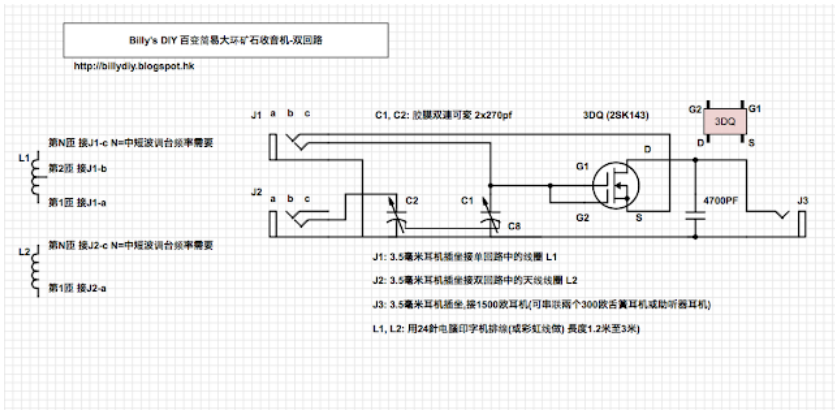
把排针每两针交错插进排线插座上, 例如排针的第一针插进排线插座的第三洞内, 第二针插进插座的第四洞内, 第三针插进插座的第五洞内, 第四针插进插座的第六洞内, ..., 第廿一针插进插座的第廿三洞内, 第廿二针插进插座的第廿四洞内. 再把J1-黄色jumper的两脚插到大环的排针#1 和#2上, 使他短路.

把J1-黑色jumper的两脚插到大环的排针#3 和#4上, 使他短路.

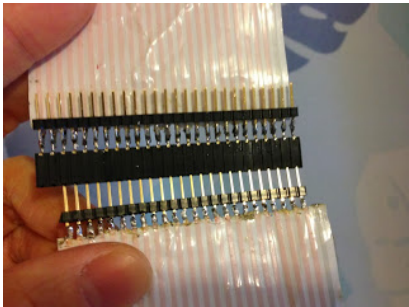
把J1-红色jumper的两脚插到大环的排针#23 和#24上, 使他短路.

这便可把排线的每一线连成大环中的每一匝, 做一个双散的十二匝的大环.

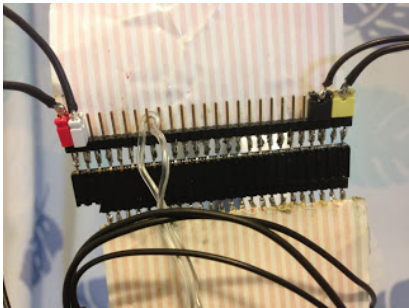
单环双回路:



[<http://2.bp.blogspot.com/-kWkDFT9avfM/UsfGSr8LSuI/AAAAAAAAABic/Gn2z9IR9ZVI/s1600/Circuit+Diagram+3.png>]
可用于2.8米长的大环。



[http://2.bp.blogspot.com/-XOO7T-oHdDs/UsfGXwic0oI/AAAAAAAAABkY/mvXKxZrWp-8/s1600/IMG_5102.JPG]



[http://4.bp.blogspot.com/-ya1XeEMghEw/UsfGW24mOSI/AAAAAAAAABkg/5RAgG5inhvc/s1600/IMG_5099.JPG]

把排针每两针交错插进排线插座上, 例如排针的第一针插进排线插座的第三洞内, 第二针插进插座的第四洞内, 第三针插进插座的第五洞内, 第四针插进插座的第六洞内, ..., 第廿三针插进插座的第廿五洞内, 第廿四针插进插座的第廿六洞内.

再把J1-黄色jumper的两脚插到大环的排针#1和#2上

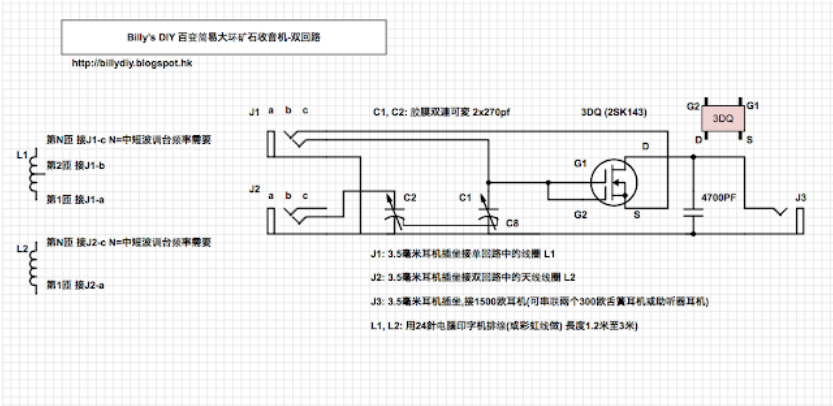
把J1-黑色jumper的的两脚插到大环的排针#3和#4上

把J1-红色jumper的其中一脚插到大环的排针#23上

把J2-白色jumper的其中一脚插到大环的排针#24上

这便可做成两个十二匝的大环, 可做双回路.

双环双回路;



[<http://2.bp.blogspot.com/-kWkDFT9avfM/UsfGSr8LSul/AAAAAAAAABic/Gn2z9IR9ZVI/s1600/Circuit+Diagram+3.png>]

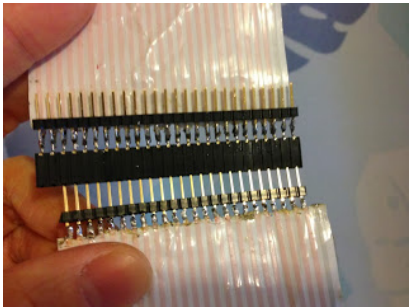
可用于2.8米长的大环。



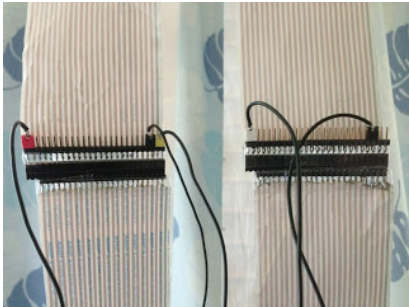
[http://4.bp.blogspot.com/-TD8htYjMlrg/UsfGb995gXI/AAAAAAAAABi4/x4NK_mk5whw/s1600/IMG_5205.JPG]

用相同长度的排线做两个大环, 大环#1 和大环#2 .

把排针每两针交错插进排线插座上, 例如排针的第一针插进排线插座的第三洞内, 第二针插进插座的第四洞内, 第三针插进插座的第五洞内, 第四针插进插座的第六洞内, ..., 第廿三针插进插座的第廿五洞内, 第廿四针插进插座的第廿六洞内.



[http://2.bp.blogspot.com/-XO07T-oHdDs/UsfGXwic0oI/AAAAAAAAABkY/mvXKxZrWp-8/s1600/IMG_5102.JPG]



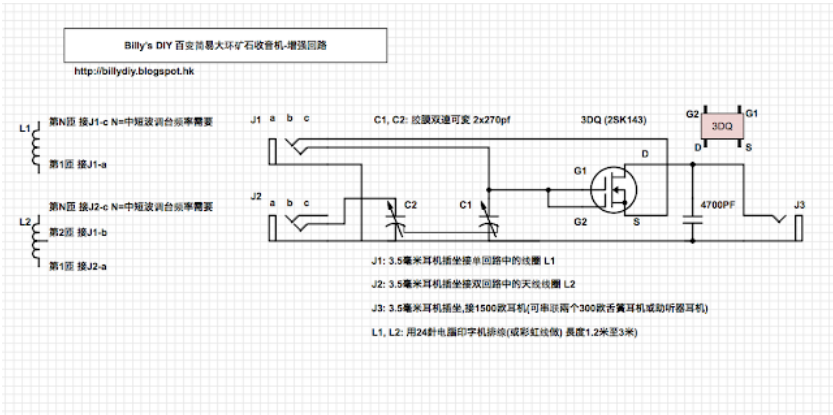
[http://4.bp.blogspot.com/-O70eMGipUi0/UsfGe7Fn8pI/AAAAAAAAABnA/KWUwo_2p4Ds/s1600/IMG_5246.JPG]

再把J1-黄色jumper的两脚插到大环#1的排针#1 和#2上,使他短路.
把J1-黑色jumper的两脚插到大环#1的排针#3 和#4上,使他短路.
把J1-红色jumper的两脚插到大环#1 的排针#25 和#26上,使他短路.

把J2-黑色jumper的两脚插到大环#2的排针#3 和#4上,使他短路.
把J2-白色jumper的两脚插到大环#2 的排针#25 和#26上,使它短路.

这便可把排线的每一线连成大环中的每一匝, 做一个双轂的十二匝的大环.

双环增强回路:



[<http://1.bp.blogspot.com/-pjmSWnaNgbU/UsfGTPv1JII/AAAAAAAAABik/31Ma7cyL-1c/s1600/Circuit+Diagram+4.png>]

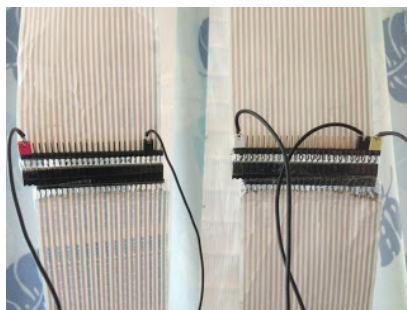
这电路原作者是lq19512003老师的无天地线磁棒矿机,现改良用于大环上.

原理是使用两个距离远到互不干扰的线圈来吸收两倍的无线电能量.

一倍能量用来检波, 另一倍提供额外能量给3DQ源极去检波以增强输出。

原理请看 <http://www.crystalradio.cn/forum.php?mod=viewthread&tid=237270>

做法和双环双回路相似, 唯一不同是把再把J1-黄色jumper的两脚改插到大环#2的排针#1 和#2上, 使他短路。



[[http://3.bp.blogspot.com/-](http://3.bp.blogspot.com/-vW5KGxW_I8k/UsfGeytnPJI/AAAAAAAAABnU/D1z-eTe-NJ8/s1600/IMG_5247.JPG)

[vW5KGxW_I8k/UsfGeytnPJI/AAAAAAAAABnU/D1z-eTe-NJ8/s1600/IMG_5247.JPG](http://3.bp.blogspot.com/-vW5KGxW_I8k/UsfGeytnPJI/AAAAAAAAABnU/D1z-eTe-NJ8/s1600/IMG_5247.JPG)]

矿机调整测试:

把耳机插进耳机插座. 我用的耳机是两个150欧的助听器耳机串联. 也可用两个300欧的舌簧耳机串联, 或接到T725阻矿匹配变压器的2.5千欧端来匹配不同阻扩的耳机。

单回路电路的调整:

调整可变电容调到想听的电台。也可改变红色jumper 接线圈的位置来调到不同的波段。

如要收短波, 可把红色jumper 接到线圈的第二匝。 ,

双回路电路的调整:

调整L1和L2的距离使选择性加强, 声量也可接受。

调整可变电容调到一个低端的电台。再调整可变电容上的两个微调电容, 使响度最大。

再调整可变电容调到一个高端的电台。再调整可变电容上的两个微调电容, 使响度最大。重复以上多一次。

然后可以调到想听的电台。无天地线接收良好, 能收数个本地强电台。

双环增强回路电路的调整:

把L1和L2的距离增大使互不干扰

调整可变电容调到一个低端的电台。再调整可变电容上的两个微调电容, 使响度最大。

再调整可变电容调到一个高端的电台。再调整可变电容上的两个微调电容, 使响度最大。重复以上多一次。

然后可以调到想听的电台。无天地线接收良好, 能收数个本地强电台。

视频展示:

http://v.youku.com/v_show/id_XNjU2MjAwMDg0.html [http://v.youku.com/v_show/id_XNjU2MjAwMDg0.html]

Posted 4th January 2014 by Billy

0 Add a comment

18th October 2013

Ball Point Pen Crystal Radio

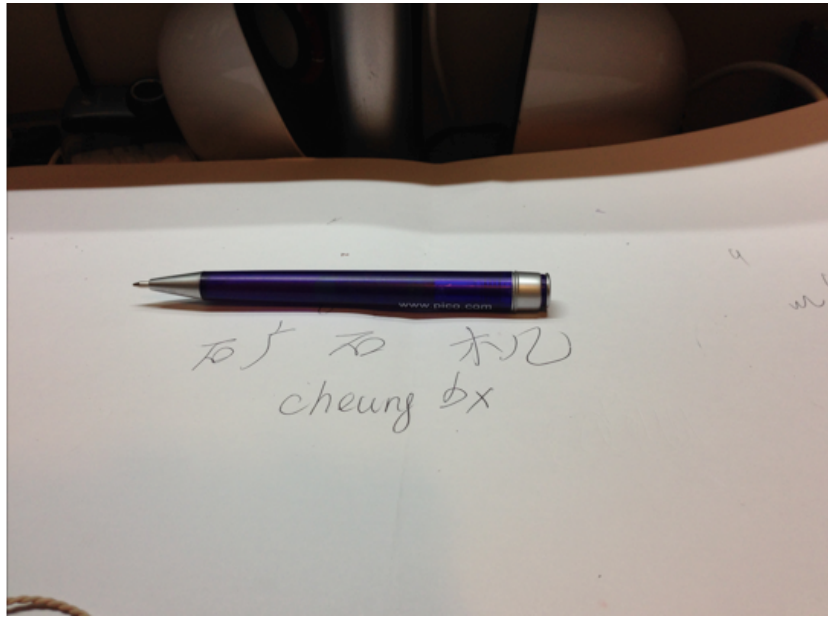
Ball Point Pen Crystal radio has been featured in 007 movies as a tool for spies. It's been manufactured in the 50's for hobbies. Now it has become a collector item and cost above HK\$1000.

Now you can DIY yourself to make one without costing a fortune.

And use it like a Spy. Nobody will know that the crystal radio is hidden inside a ball pen.

Check out this Youtube Video: <http://www.youtube.com/watch?v=VsNDIoLwYPs> [[http://www.youtube.com/watch?](http://www.youtube.com/watch?v=VsNDIoLwYPs)

Dynamic Views theme. Powered by Blogger.



[<http://4.bp.blogspot.com/-YEyeHrhBKg0/UmFghztqAnI/AAAAAAAAABgg/4SnbM1iUJYw/s1600/Screen+Shot+2013-10-18+at+1.38.31+AM.png>]



[<http://3.bp.blogspot.com/-AKov792511Y/UmFghyM1sml/AAAAAAAAABgw/kZECAC83dw/s1600/Screen+Shot+2013-10-18+at+1.04.46+AM.png>]



[http://4.bp.blogspot.com/-A2tc95w_s_Q/UmFgh6MzkdI/AAAAAAAAABg0/xaxvF0O5wNk/s1600/Screen+Shot+2013-10-18+at+1.04.26+AM.png]



[<http://4.bp.blogspot.com/-KOxoP449pMs/UmFgi2zLqBI/AAAAAAAAABhE/SVzdo3UbaEs/s1600/Screen+Shot+2013-10-18+at+1.39.27+AM.png>]



[http://4.bp.blogspot.com/-2FICJcSJ-gY/UmFgjLUpDMI/AAAAAAAAABhQ/6rmnoi2o_4/s1600/Screen+Shot+2013-10-18+at+1.39.47+AM.png]



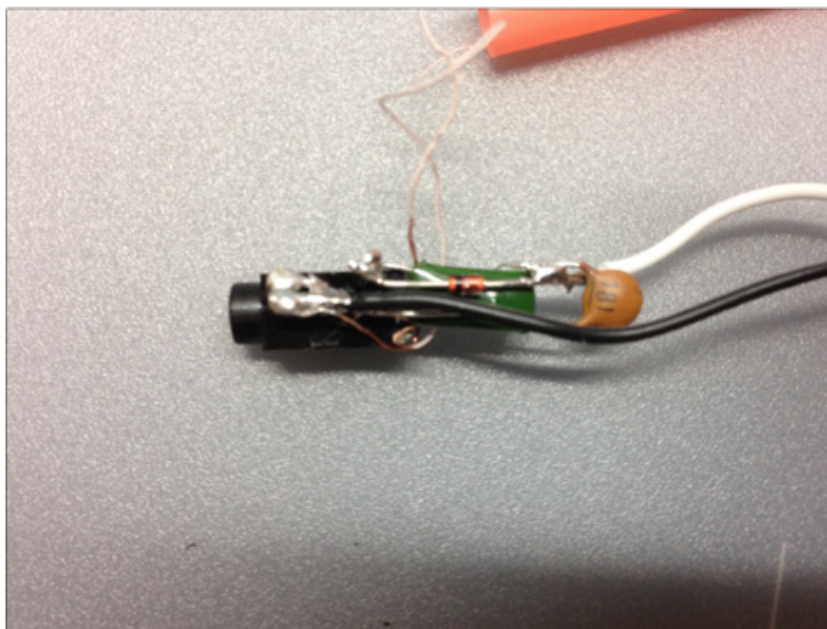
[<http://1.bp.blogspot.com/-VKTXAnc3FxE/UmFgj3u-FFI/AAAAAAAAABhY/FmtrUKa00Wk/s1600/Screen+Shot+2013-10-18+at+1.39.55+AM.png>]



[http://2.bp.blogspot.com/-sOY3yknP_D8/UmFgkJd9EXI/AAAAAAAAABho/8uoN3HKazEY/s1600/Screen+Shot+2013-10-18+at+1.40.04+AM.png]



[<http://2.bp.blogspot.com/-Wps5tmeISLY/UmFgkDkvs7I/AAAAAAAAABhg/-QoCWIYd5Fo/s1600/Screen+Shot+2013-10-18+at+1.40.27+AM.png>]



[<http://2.bp.blogspot.com/-kipBW--wVKU/UmFgkihFHjI/AAAAAABhS/JliACoZKdFA/s1600/Screen+Shot+2013-10-18+at+2.14.21+AM.png>]

在网上看到圆珠笔矿机，现在已成收藏品，售价 \$1000 高得有点过份。

我成功DIY了一个圆珠笔矿机，改良了一些，比网上的更好：

- 1，此圆珠笔矿机能用来书写。
- 2，没有固定连着的线，只在笔顶装了个微型双声道插座，接耳机，天地线。要另外做一根转换线来把双声道插成分成单声道耳机和天地线。
- 3，单凭外型，你没法知道这是部矿机。

花了不小时间找合用的圆珠笔及小型磁棒。

数天的试验，用了四枝不同的圆珠笔。

圆珠笔矿机终于做成。

做法：

用吸管做线架，用0.04x14股线绕了两层共25毫米长，7毫米粗的线圈，加了磁棒在最中央位置时最高电感约 480uH。

用个30毫米长4毫米粗的小型磁棒在吸管内作拉杆式调台，

配合180PF固定电容（加上线圈和其他引线产生的约10PF分布定电容）可覆盖大部分中波频率。

有待改良：

因是微型制作，只用了单回路及BAT85二极管检波。

有空可改用3DQ电路，直接焊在贴片上。

也可加绕线圈，改成双回路，可改善现在的轻微串台。

但不知用调感式调台能用双回路吗？

现在的笔芯是用AB胶固定的，不能更换。

可改用固定在小型磁棒上的小圆管来接入笔芯，方便更换

在家中加上天地线后接收良好，能收所有强台。

当天线太强时，有轻微串台，要用天调修正。

今天带了圆珠笔矿机回单位，接上我做的排线间易大环当天线，用电源地线当地线，能收数个强台。

也吸引了各同工的眼球。

大家都说我是危险人物，什么间谍用品都有。

补充内容

加了个线圈抽头接检波二极管，选择性好了。

用胶布把笔芯固定现可更换。

加了海绵在拉杆和吸管中间，防滑防走台。

上了测试及圆珠笔矿机解体的视频.可到20楼看看。

http://v.youku.com/v_show/id_XNjIzMzIzMTg0.html [http://v.youku.com/v_show/id_XNjIzMzIzMTg0.html]

Posted 18th October 2013 by [Rilliv](#)

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1 View comments



Great Deal At Oakland Ca!! in Oakland...
\$499,000



Hot Off Market Way Below Market...
\$140,000

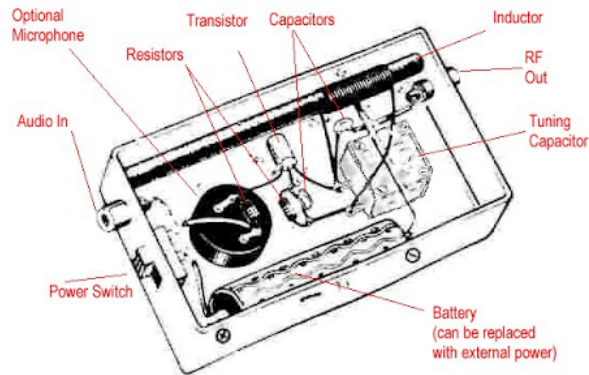


Hot Deal At Oakland Ca!!! in Oal
\$650,000

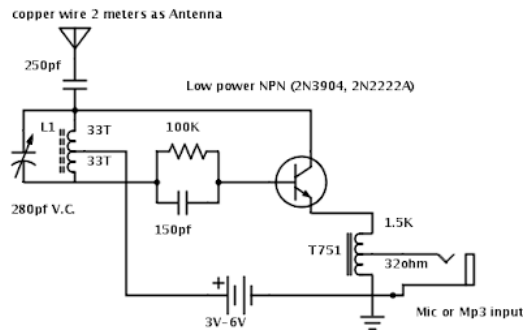
M

12th October 2013 Simple AM Transmitter.

Create an AM transmitter to broadcast your own AM radio station to test Crystal Radio.
Range is within a few meters.



[http://3.bp.blogspot.com/-k0b9RVoeD-o/UllliE_exm2I/AAAAAAAAABgM/9_cVc0QnPi8/s1600/Screen+Shot+2013-10-12+at+10.33.36+PM.png]



L1: Wound 66 turns on a 10mmx 100mm powder core, tap at 33 turns. Using 0.4mm magnet wire.

[http://3.bp.blogspot.com/-_ldsAQVXeY4/UllliE7UQzSI/AAAAAAAAABgI/6VxeycMemao/s1600/Screen+Shot+2013-10-12+at+10.47.17+PM.png]

Posted 12th October 2013 by Billy

0 Add a comment

25th September 2013 Portable Antenna Free Powder Core Crystal Radio



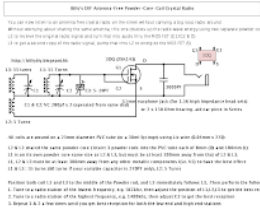
http://4.bp.blogspot.com/-izv3DGadbUw/UkMCAJssgCI/AAAAAAAAABeQ/p39Y_vIN8Jo/s1600/Screen+Shot+2013-09-24+at+11.28.38+PM.png

Because space is limited, only thin-film variable capacitor can be used. However, it does not effect the function of the original circuit.

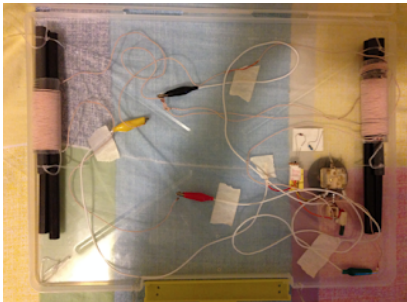
The radio can receive all local stations without an antenna.

When tested in the streets, I attracted some passers-by. They saw a transparent enclosure, and try looking for batteries. When they can not find it, they asked me why. I explained to them that a Crystal Radio runs without battery. They were amazed.

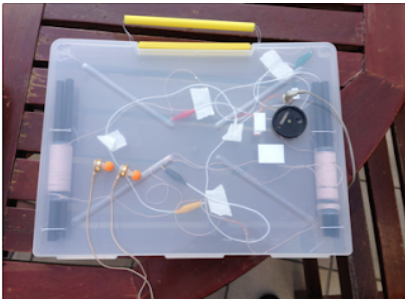
Everybody try to classify crystal radio enthusiasts into types: technical, artistic. I think I might be practical, as I tend to create portable crystal radios that I can listen to on the road. For example, I can bring this portable radio to the office, stand it up as a normal file, and listen to crystal radio when I have a coffee break.



http://4.bp.blogspot.com/-HqJDAJaziPw/UkMCaKAWXPI/AAAAAAAAABeU/4HFZ6v_6jBA/s1600/Antenna-Free-Powder-Core-Coil-Crystal-Radio.png



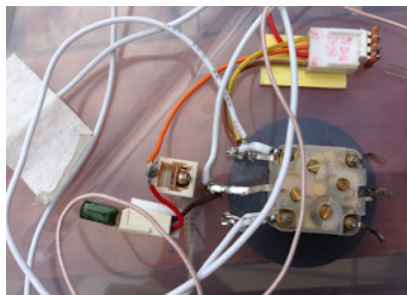
<http://1.bp.blogspot.com/--jORnWCTpiA/UkMCaCaiN4I/AAAAAAAAABeY/plvWp5UHW8/s1600/Screen+Shot+2013-09-24+at+11.29.03+PM.png>



<http://3.bp.blogspot.com/-d8s4ZsgRUI4/UkMCvSyunMI/AAAAAAAAABfM/aHaGstR9vIk/s1600/Screen+Shot+2013-09-25+at+10.09.40+PM.png>



[<http://1.bp.blogspot.com/-UdMo7FoYpmY/UkMCvR3keal/AAAAAAABfQ/-Q6t8f7pt7w/s1600/Screen+Shot+2013-09-25+at+10.10.19+PM.png>]



[http://3.bp.blogspot.com/-W5Yy5u_XLys/UkMCv5nFCcl/AAAAAAABfY/ED4JKVPKKT0/s1600/Screen+Shot+2013-09-25+at+10.10.28+PM.png]



[<http://2.bp.blogspot.com/-1A8lxN3oDEM/UkMCwAp7zBI/AAAAAAABfg/BIWOFc7GSwg/s1600/Screen+Shot+2013-09-25+at+10.10.38+PM.png>]



[<http://3.bp.blogspot.com/-3DBToSIGbOM/UkMCwX11b0I/AAAAAAABfo/XYItAyzvY08/s1600/Screen+Shot+2013-09-25+at+10.10.47+PM.png>]



[\[http://3.bp.blogspot.com/-ptWV1nQ2PnY/UkMCxO4PChI/AAAAAAAAABfw/wQeReC9hTzw/s1600/Screen+Shot+2013-09-25+at+10.10.55+PM.png\]](http://3.bp.blogspot.com/-ptWV1nQ2PnY/UkMCxO4PChI/AAAAAAAAABfw/wQeReC9hTzw/s1600/Screen+Shot+2013-09-25+at+10.10.55+PM.png)

Posted 25th September 2013 by Billy

0 Add a comment

18th September 2013

Crystal Radio Testing in Mumbai

I brought my umbrella crystal radio to India. In a hotel close to the sea in Mumbai, I was able to receive a few local AM stations. The volume was really high.

See this video. <http://youtu.be/ip3z3q34N0E> [\[http://youtu.be/ip3z3q34N0E\]](http://youtu.be/ip3z3q34N0E)



[\[http://3.bp.blogspot.com/-lt4GcDMtXjI/Ujm4klnK91I/AAAAAAAAABd0/fESNZtEbARQ/s1600/Screen+Shot+2013-09-12+at+12.05.30+PM.png\]](http://3.bp.blogspot.com/-lt4GcDMtXjI/Ujm4klnK91I/AAAAAAAAABd0/fESNZtEbARQ/s1600/Screen+Shot+2013-09-12+at+12.05.30+PM.png)



[\[http://1.bp.blogspot.com/-HsVOyO-wEWI/Ujm4jlqfEJI/AAAAAAAAABdQ/QCAGtdubgeE/s1600/Screen+Shot+2013-09-12+at+12.04.56+PM.png\]](http://1.bp.blogspot.com/-HsVOyO-wEWI/Ujm4jlqfEJI/AAAAAAAAABdQ/QCAGtdubgeE/s1600/Screen+Shot+2013-09-12+at+12.04.56+PM.png)



[<http://1.bp.blogspot.com/-It4GcDMtXji/Ujm4klnK91I/AAAAAAAAABd4/YzGUTFPo7Ik/s1600/Screen+Shot+2013-09-12+at+12.05.30+PM.png>]



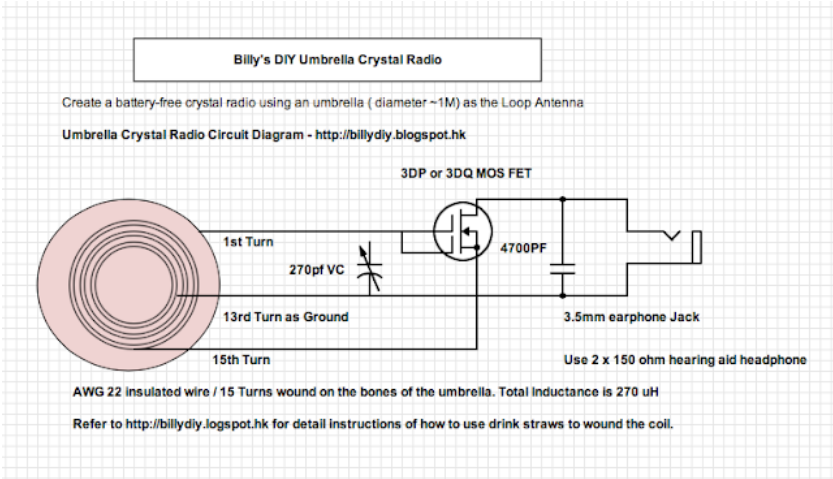
[http://3.bp.blogspot.com/-W0_Yk26Ydes/Ujm4mN_XPRI/AAAAAAAAABds/8p-g9JvZcwY/s1600/Screen+Shot+2013-09-12+at+12.28.25+PM.png]



[<http://4.bp.blogspot.com/-vQeQ4lNqHZc/Ujm4kwfyFSI/AAAAAAAAABdY/aqVxHhQ6mec/s1600/Screen+Shot+2013-09-12+at+12.05.52+PM.png>]



[http://3.bp.blogspot.com/-VNpSwlwYeFo/Ujm4IBXV96I/AAAAAAAAABdw/0_bo67TmaQs/s1600/Screen+Shot+2013-09-12+at+12.27.16+PM.png]



[<http://4.bp.blogspot.com/-ifl5C9xQo1o/Ujm4jtDTcyl/AAAAAAAAABdg/FYmuaggicmU/s1600/Screen+Shot+2013-09-12+at+10.33.52+PM.png>]

Posted 18th September 2013 by Billy

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BOOK NOW

WHISTLERBLACKCOMB

1st September 2013

Why Radio Reception is better at night?

Why Radio Reception is better at night?

In short at night the medium wave, short wave signals can transmit further because the ionospheric layer that bounces these medium wave and short wave signals all over the world gets thicker at night. In the morning when the sun is up, this ionospheric layer gets thinner and the reflection of radio wave will not be as effective. Due to this effect, radio broadcasting station will lower their transmission power a bit to avoid broadcasting to another country.

According to international regulations, a portion of the radio frequency range of electromagnetic waves is reserved for radio broadcasts.
This is further divided into :

- LW or long wave (frequency range of 150 to 405 kHz) ,
- MW or medium-wave (525 ~ 1605 kHz) ,
- SW or shortwave (2.3 to 26.1 MHz, including 12 m section , see "SW Shortwave Frequency") ,
- FM (band divided from country to country , varies by region) .

SW Shortwave Frequency

UHF	Frequency (MHz)	UHF	Frequency (MHz)
11	25.600-26.100	41	7.100-7.300
13	21.450-27.750	49	5.950-6.200
16	17.700-17.900	60	4.750-5.060
19	15.100-15.450	75	3.900-4.000
25	11.700-11.975	90	3.200-3.400
31	9.500 - 9.775	120	2.300-2.495

Longwave lowest frequency depends mainly on the ground wave transmission, propagation distance, receiver performance is very stable throughout the year . Used mainly in European countries for domestic broadcasting. China has no long-wave radio stations.

Mediumwave is also propagated by terrestrial transmission , similar to that of longwave similar, but influenced by the geographical environment - better over a level surface is better, e.g. fields, plains, sea. worse over the forest, mountains.

transmission. This will also mean that more radio stations from all over the world (local at home, and from the overseas) can be received and jammed into your radio, interfering one another.

SW - shortwave is transmitted mainly by ionospheric effects by multiple reflections spread to thousands of kilometers away, even halfway around the world. This is how the international shortwave radio stations are broadcasted. The ground wave transmission distance for short wave (SW) is limited.

As the short wave gets to your radio through several reflections, the signal strength will be unstable and the volume will fluctuate from time to time. So the high-end shortwave radios have automatic gain control circuit (AGC) to improve the stability of radio reception.

Shortwave reception performances changes with time, season and weather conditions. Average winter sunny day is best, while rainy days in summer nights are the worst.

In addition, your location may be within the quiet zones, namely the area between two reflections. The quiet zone varies by time and frequency. So some radio stations will broadcast using multiple SW frequencies simultaneously and adjust with the change of season.

FM Radio FM mode is generally used for high-fidelity stereo broadcast, the division of the frequency range is complex because it need to jam into the limited spectrum left over from the television broadcasting channels.

FM frequency range is different per country: E.g. Russia from 65.8 to 73 MHz, Japan, from 76 to 90 MHz, China, US and Europe 88 ~ 108 ~ 104 MHz or 88 MHz. FM signal and the television broadcast signal is propagated only on a straight line, so the FM program can only be received in the region locally. The general maximum distance does not exceed 100 km. The reception is very stable as the signal is broadcasted over a straight line to a limited geographical location all under good control. Because the propagation distance is small, each region may be from a broadcast network, the same band can be reused.

In summary, at night the medium wave, short wave signals can transmit further because the ionospheric layer that bounces these medium wave and short wave signals all over the world gets thicker at night. In the morning when the sun is up, this ionospheric layer gets thinner and the reflection of radio wave will not be as effective. Due to this effect, radio broadcasting station will lower their transmission power a bit to avoid broadcasting to another country.

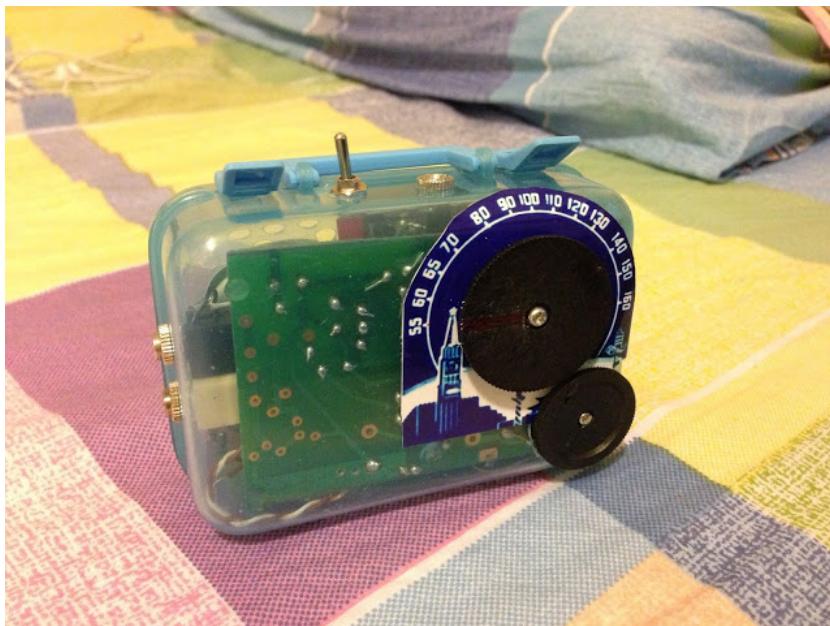
Posted 1st September 2013 by Billy

0 Add a comment

1st September 2013

TA7642+LM386 regeneration radio

TA7642 (aka MK484) is an IC for AM and SW radio. It has all the circuit you need to make a regeneration radio of Auto Gain Control. Only need to add the LM386 to amplify the sound to drive the speaker.

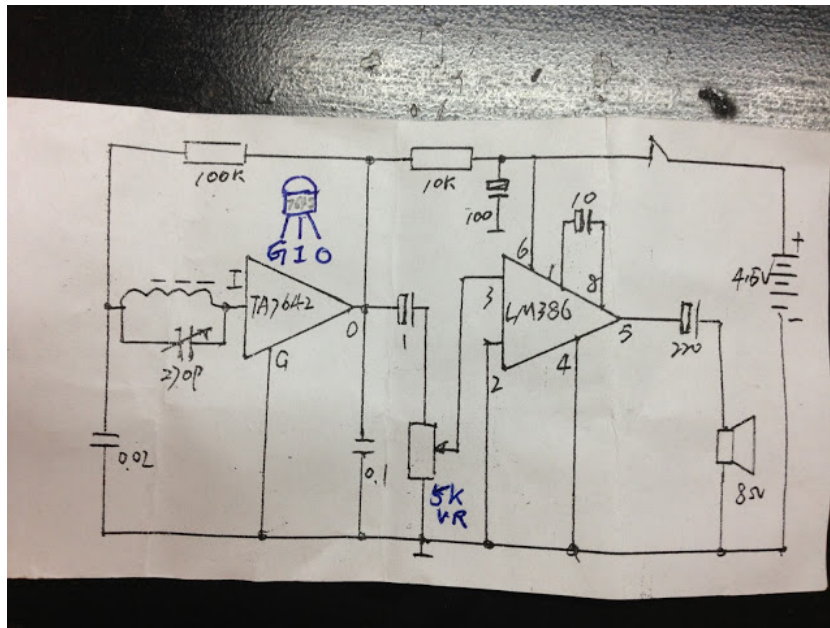


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I have ordered the circuit board from the Taobao shop and changed the circuit a bit to double it up as an amplifier for my other crystal radios.

I also added a socket to insert an external radio coil, so I can connect my 1 meter diameter SW radio loop coil (made of

9mm copper tube, see last photo below), and change it to an Short Wave Radio.



[<http://2.bp.blogspot.com/-t8UIUSu63tg/UjNNLdIAvfi/AAAAAAAAABaw/gnHYsE6Pw5Y/s1600/Circuit+Diagram.JPG>]



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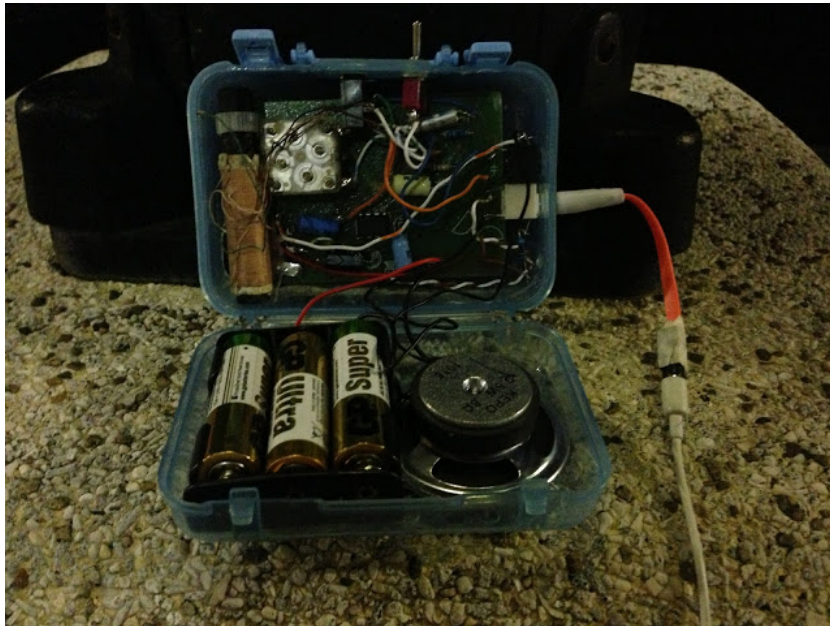
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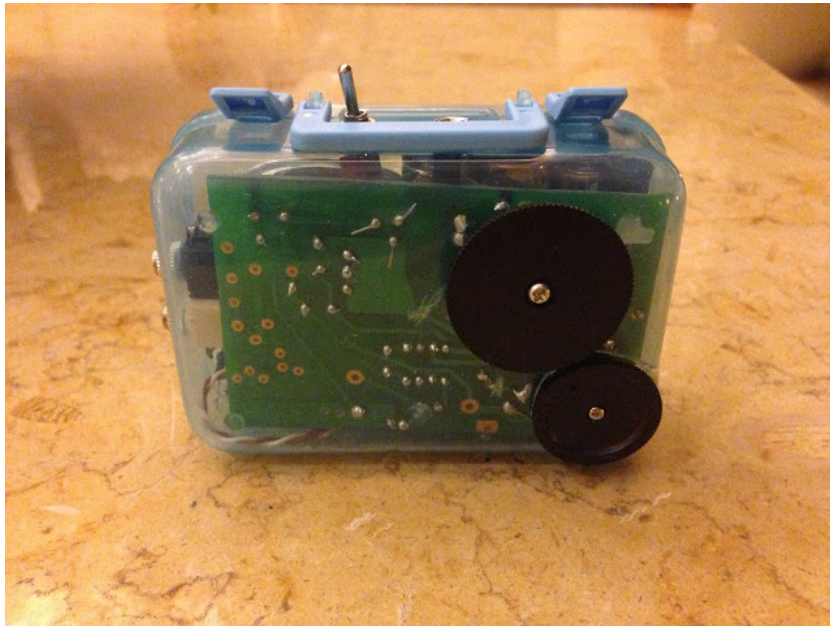
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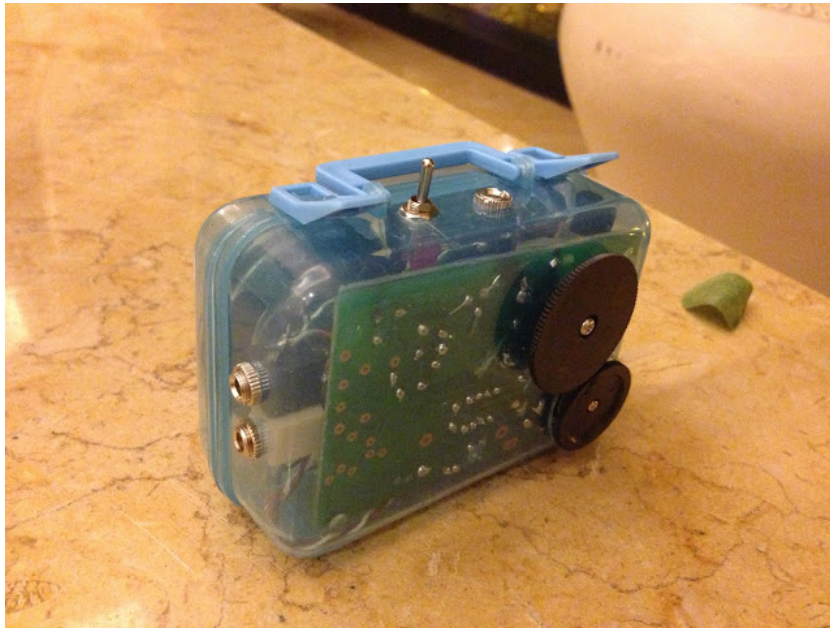
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[<http://1.bp.blogspot.com/-8njHZaQqhhU/UiNNQHAJiyI/AAAAAAAAABco/x8rW1VptH8Q/s1600/Short+Wave+Big+Loop.png>]

Posted 1st September 2013 by Billy

3

[View comments](#)

29th August 2013

Antenna-Free Powder-Core-Coil Crystal Radio

You can now listen to an antenna free crystal radio on the street without carrying a big loop radio around.



[<http://4.bp.blogspot.com/-Dw4S-jKjN3s/UiAdAxqeEQI/AAAAAAAAABYg/Ao6hPtYDh9E/s1600/Screen+Shot+2013-08-29+10+10+21.png>]

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[http://2.bp.blogspot.com/-D_R-juaEpdQ/UiAdGIH42NI/AAAAAAAAABZE/pMNHKBbHy3I/s1600/Screen+Shot+2013-08-30+at+9.58.34+AM.png]

Checkout this [youtube video](http://youtu.be/kRPYu5_Lh-8) for the testing of this radio [http://youtu.be/kRPYu5_Lh-8] :

Without worrying about sharing the same antenna, this one doubles up the radio wave energy using two separate powder core coils .

L1 to receive the original radio signal and turn that into audio thru the MOS FET (G1/G2 & D).

L3 to get a second copy of the radio signal, pump that thru L2 to energize the MOS FET (S).

All coils are wound on a 25mm diameter PVC tube (or a 30ml Syringe) using Liz wire (0.04mm x 270).

L2 & L3 shared the same powder core (Insert 3 powder rods into the PVC tube each of 8mm (D) and 180mm (L) .

L1 is on its own powder core same size as L2 & L3, but must be at least 300mm away from that of L2 & L3.

L1, L2 & L3 must be at least 300mm away from any other metallic components I(i.e. VC) to have the best effect.

L1 & L3 : 55 turns (60 turns if your variable capacitor is 270PF only), L2: 5 Turns.

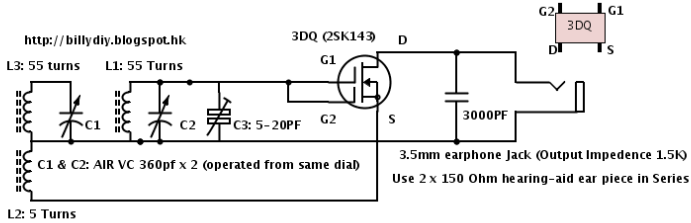
L1 & L3 : 55 turns (60 turns if your variable capacitor is 270PF only), L2: 5 Turns.

Position both coil L1 and L3 to the middle of the Powder rod, and L3 immediately follows L3.. Then perform the following adjustments:

1. Tune to a radio station of the lowest frequency, e.g. 567khz, then adjust the position of L1,L2,L3 to get the best reception .
2. Tune to a radio station of the highest frequency, e.g. 1400khz, then adjust C3 to get the best reception.
3. Repeat 1 & 2 a few times until you get best reception for both the low end and high end stations

Billy's DIY Antenna-Free Powder-Core-Coil Crystal Radio

You can now listen to an antenna free crystal radio on the street without carrying a big loop radio around
Without worrying about sharing the same antenna, this one doubles up the radio wave energy using two separate powder core coils
L1 to receive the original radio signal and turn that into audio thru the MOS FET (G1/G2 & D)
L3 to get a second copy of the radio signal, pump that thru L2 to energize the MOS FET (S)



All coils are wound on a 25mm diameter PVC tube (or a 30ml Syringe) using Liz wire (0.04mm x 270)
L2 & L3 shared the same powder core (Insert 3 powder rods into the PVC tube each of 8mm (D) and 180mm (L)
L1 is on its own powder core same size as L2 & L3, but must be at least 300mm away from that of L2 & L3.
L1, L2 & L3 must be at least 300mm away from any other metallic components (i.e. VQ) to have the best effect
L1 & L3: 55 turns (60 turns if your variable capacitor is 270PF only), L2: 5 Turns

- Adjustments:
1. Tune to a radio station of the lowest frequency, e.g. 567khz, then adjust the position of L1,L2,L3 to get the best reception
 2. Tune to a radio station of the highest frequency, e.g. 1400khz, then adjust C3 to get the best reception
 3. Repeat 1 & 2 a few times until you get best reception for both the low end and high end stations

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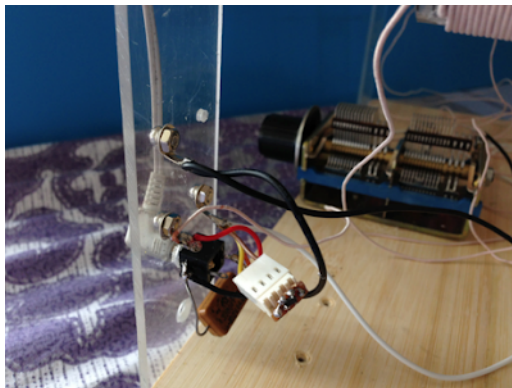
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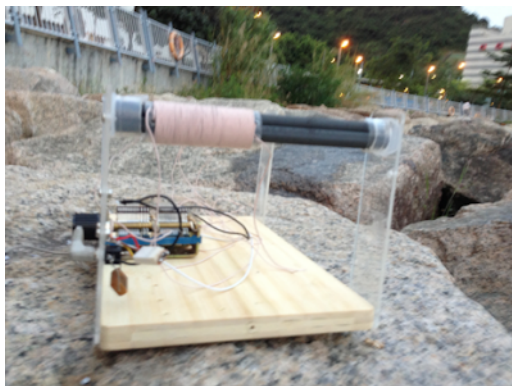
[http://2.bp.blogspot.com/-rirmOxQbJJ4/UiAdAXYM_Sl/AAAAAAAABYU/rmtPztgMeGo/s1600/Screen+Shot+2013-08-29+at+10.18.52+PM.png]



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Posted 29th August 2013 by Billy

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12th August 2013

Portable Document Tray Crystal Radio

Portable Document Tray Crystal Radio



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[13+at+10.03.46+AM.png\]](#)

Make a battery-free crystal radio using a filing box.

Place it next to the window to listen to radio stations without battery.

You can also put it inside your briefcase or backpack and listen to crystal radio while you are traveling.

How to make it:

Find a plastic filing box, the bigger the better. The one I got is B4 (380mmx280mm). It'll be even better if you can find an A3 filing box.

Then wound a radio coil inside following the instructions below:

Make a card board coil mod same size as the filing box. Cut 9 slots 40mm deep, 10 mm wide at the edge of the boards. The number of slots must odd, as we need the wires to go above and below to create a spider web effect. This will be better for the radio signal reception.

Get some regular electric wires size around SWG22. Wound 26 turns above and below the slots as shown in the video. [How to wind a spiderweb radio coil.](http://www.youtube.com/watch?v=GHq7fVLr9OI) [<http://www.youtube.com/watch?v=GHq7fVLr9OI>]

Then fix the wire in place, by either tinging each slot up with fishing wire or super glue or rubber gun.

Drill some holes into the back of the filing box so you can tie the radio coil up.

Drill more holes to hold the crystal radio components.

We will need a MOS FET called (2SK143, or 3DQ), a plastic variable capacitor that goes from 20pf to 270pf as you adjust the dial.

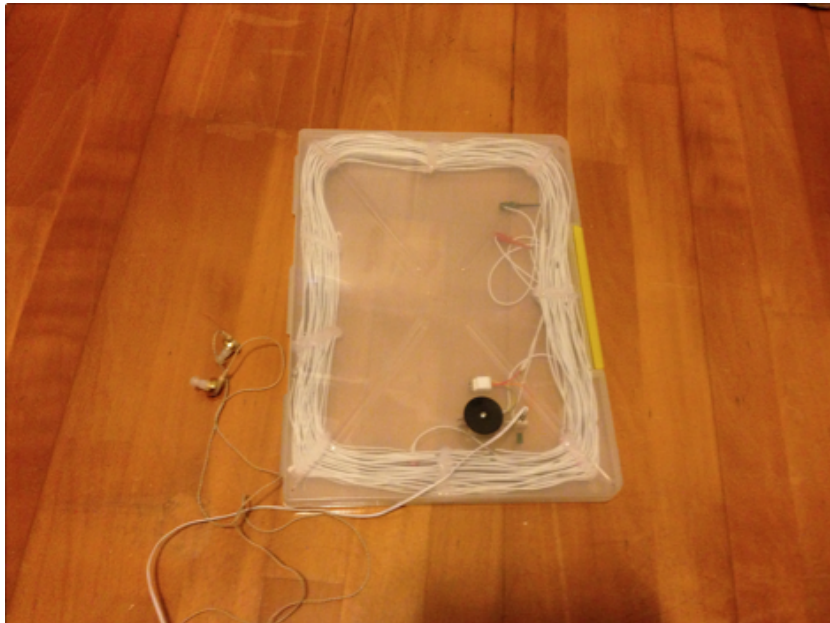
A 3.5mm headphone socket.

Two hearing aid headphones (300 Ohm) connected in series to a mono 3.5mm headphone jack.

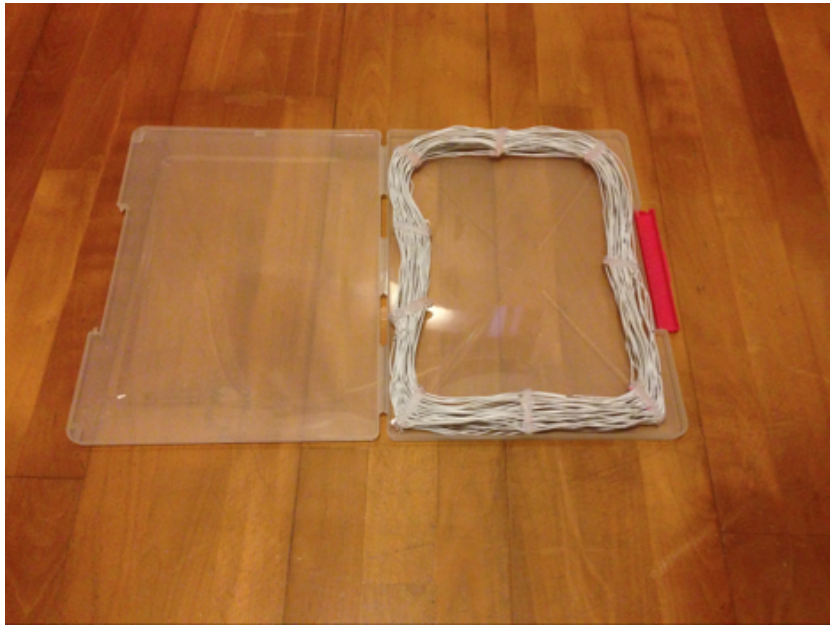
This radio operates without antenna nor ground.

You can receive several local radio stations, and the sound is loud.

You can also turn it into a briefcase crystal radio by adding a handle.



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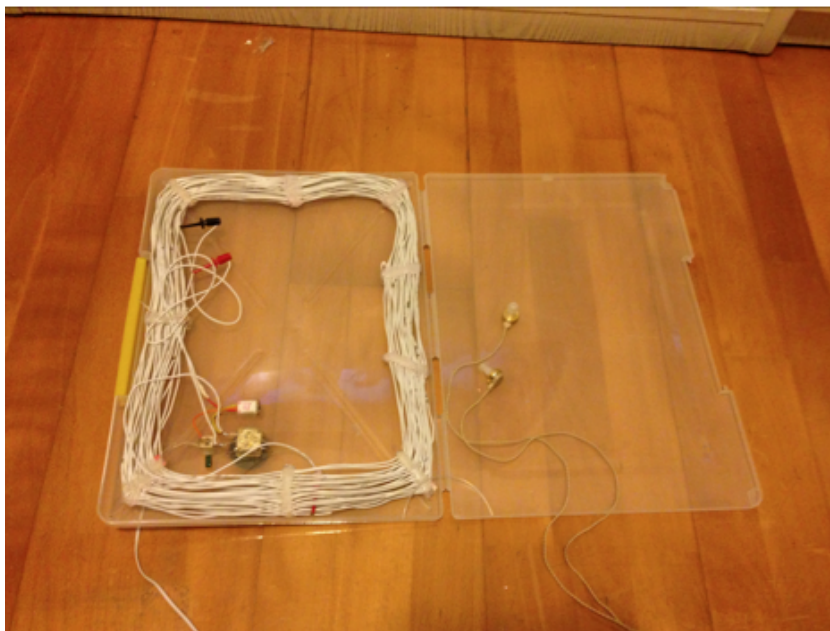
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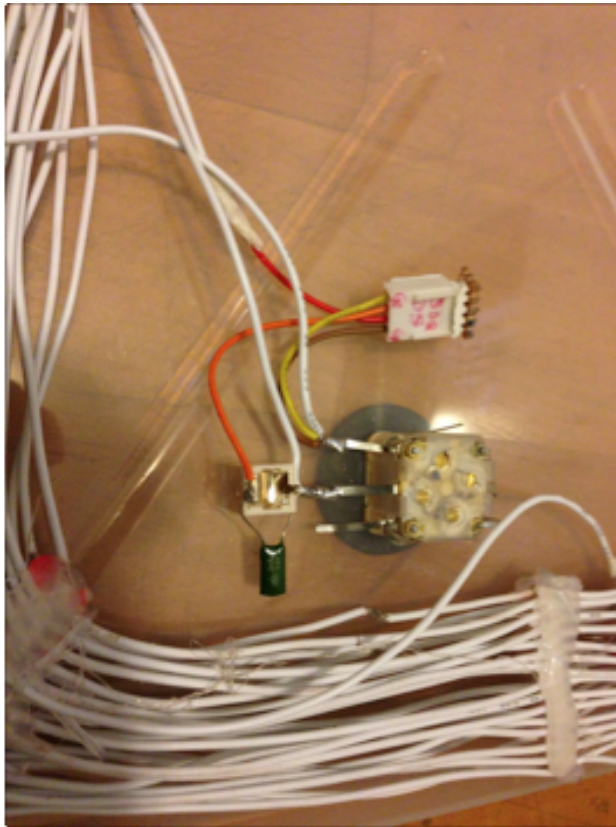
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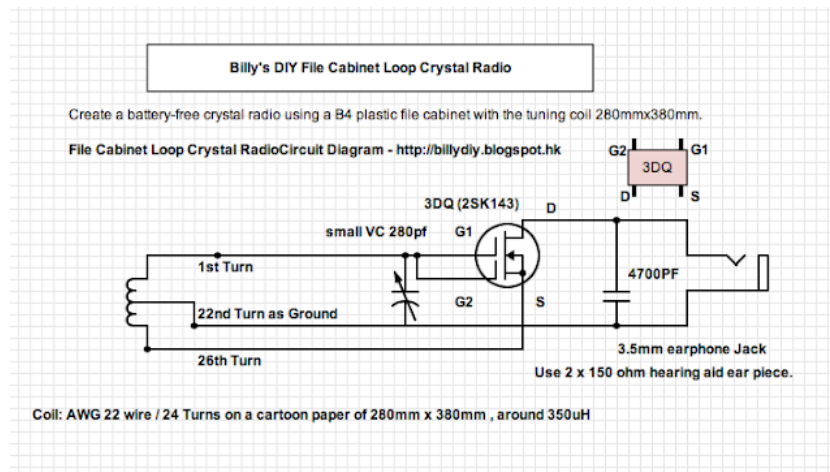
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Posted 12th August 2013 by [Billy](#)

0 Add a comment

10th August 2013

You need a crystal earphone to listen to the battery free crystal radio.
I've been making the crystal earphone myself as it's hard to buy in Asia.
A friend of mine helped me buy a few crystal earphone from US (Ceramic Earphone US \$ 3.5).
I compared the factory made crystal earphone (left) with the ones I made myself (right).

The result: the homemade crystal earphone won!

The factory made one is not as loud as the homemade one, it's about 30% softer. The homemade one has better audio quality, with a much richer base than the factory made one.

If you also want to own a look at my other posts:

<http://billydiy.blogspot.hk/2013/03/build-crystal-earphone-for-crystal.html> [<http://billydiy.blogspot.hk/2013/03/build-crystal-earphone-for-crystal.html>]

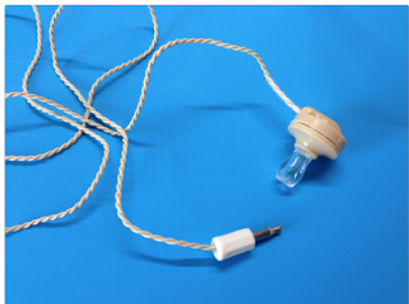
<http://www.crystalradio.cn/thread-390154-1-1.html> [<http://www.crystalradio.cn/thread-390154-1-1.html>]



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Posted 10th August 2013 by Billy

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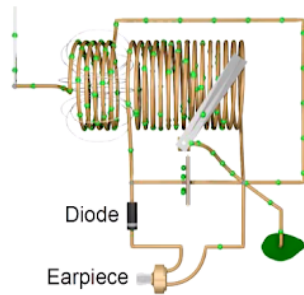
29th July 2013

How Crystal Radio Works & useful links

How Crystal radio work?

Text explanation

<http://www.crystalradio.net/howitworks/index.shtml> [<http://www.crystalradio.net/howitworks/index.shtml>]



[<http://1.bp.blogspot.com/-1S4kzIMb2b8/UfZuLaK2wYI/AAAAAABVE/gXJNMI5PVoU/s1600/Screen+Shot+2013-07-29+at+9.28.45+PM.png>]

Video explanation

<http://www.youtube.com/watch?v=0-PParSmwtE> [<http://www.youtube.com/watch?v=0-PParSmwtE>]

Some useful links

1. [How to make a Foxhole radio](http://www.youtube.com/watch?v=vU8zaszyTYA) [<http://www.youtube.com/watch?v=vU8zaszyTYA>] - The simplest crystal radio



[<http://4.bp.blogspot.com/-jAm9LD1caE8/UfZvTnvJbhl/AAAAAABVM/pzoHg-lsh1g/s1600/Screen+Shot+2013-07-29+at+9.33.31+PM.png>]

2. Crystal Radio Forum in China - www.crystalradio.cn [<http://www.crystalradio.cn/forum-3-1.html>]
3. Crystal Radio Forum in US - www.crystalradio.net [<http://www.crystalradio.net/>]
4. <http://www.radio-world.com.cn/forum.php?mod=forumdisplay&fid=5> [<http://www.radio-world.com.cn/forum.php?mod=forumdisplay&fid=5>]
5. 中国电子DIY之家- 收音机DIY [<http://www.ndiy.cn/forum-107-1.html>]
6. <http://www.haodiy.net> [<http://www.haodiy.net/a/jishuwenzhang/shouyinjiwuxiandianDIY/shouyinji/>]
7. Online circuit diagram drawing tool [<http://www.digikey.com/schemeit>]
8. My Chinese Blog - 小張夢工場 [<http://billydiydreamshop.lofter.com/>]

Posted 29th July 2013 by Billy

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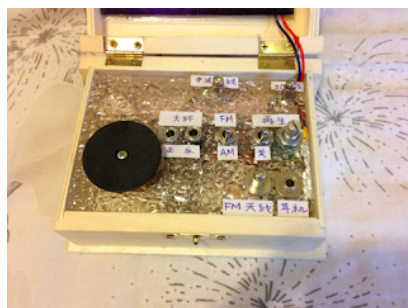


I designed a small gift box AM FM solar powered regeneration crystal radio. All wiring done with silver-plated wire to allow a variety of functions and AM FM coils to be placed in a 120mmx90mmx40mm small box. Appears to be an ordinary wooden box, yet opens into a crystal radio.

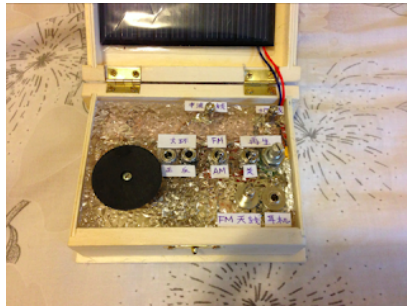
This cute gift box crystal radio can be a gift for the children. Promote interest in crystal radio. The machine can operate with or without power.

AM circuit includes 100mm ferrite rod with a coil wound using 0.05x120 lz wire.

http://www.youtube.com/watch?v=i72lr_EHQ6Q [http://www.youtube.com/watch?v=i72lr_EHQ6Q]



[<http://1.bp.blogspot.com/-8z-oxBzXhOU/UefddaoTF6I/AAAAAAAAABSk/UeyFgyCkqSI/s1600/Screen+Shot+2013-07-16+at+12.06.18+AM.png>]

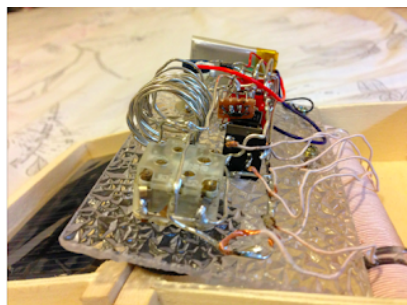


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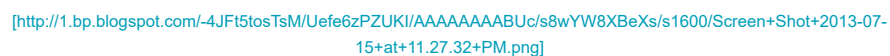
[[http://3.bp.blogspot.com/-](http://3.bp.blogspot.com/-NTm3KsqTde4/UefdeLAy8II/AAAAAAAAABTE/XsW1tFsgvM/s1600/Screen+Shot+2013-07-16+at+12.16.03+AM.png)

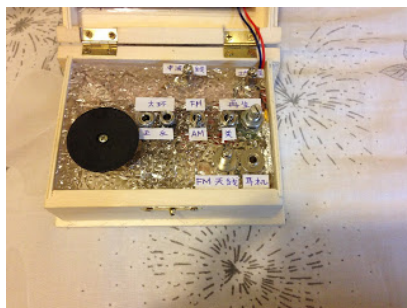
[NTm3KsqTde4/UefdeLAy8II/AAAAAAAAABTE/XsW1tFsgvM/s1600/Screen+Shot+2013-07-16+at+12.16.03+AM.png](http://3.bp.blogspot.com/-NTm3KsqTde4/UefdeLAy8II/AAAAAAAAABTE/XsW1tFsgvM/s1600/Screen+Shot+2013-07-16+at+12.16.03+AM.png)]



[[http://4.bp.blogspot.com/-Vx697Z5hkSw/UefdeRtSY_I/AAAAAAAAABS8/i-](http://4.bp.blogspot.com/-Vx697Z5hkSw/UefdeRtSY_I/AAAAAAAAABS8/i-2pUmWrpWw/s1600/Screen+Shot+2013-07-16+at+12.16.24+AM.png)

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[http://4.bp.blogspot.com/-bjUbOfyQk3U/UefdsBscurl/AAAAAAAAABT4/ilwgoctHxk4/s1600/IMG_2834.JPG]

Posted 17th July 2013 by [Billy](#)

0 Add a comment

6th July 2013

What is AM and FM ?

What is AM and FM ? Are AM and MW the same thing ?

Audible Frequency

standard range of audible frequencies [https://en.wikipedia.org/wiki/Hearing_range] for humans is 20 to 20,000 Hz, However, the audible frequency ,e.g. the music , is not efficient to be broadcasted over radio wave nor can travel very far.

To solve the problem, we will need something to carrier the music. This something is called the Carrier wave.

Then we need to use a method to put the music onto the carrier wave and produce the ultimate radio wave that can be broadcasted. This method is called modulation.

Common layman terms that are mostly right , but not always right.

AM and MW usually means the same thing in layman terms. It means the broadcast radio transmitted at the frequency within the medium wave (MW) frequency range (or Band) -(540Khz to 1650khz) and modulated using AM (Amplitude Modulation).

MW is a subset of a standard term called MF - Medium Frequency) that describe frequency range of 300Khz to 3000Khz. See table below).

Amplitude modulation means the carrier frequency is fixed all the time, but the amplitude of the carrier wave will vary according to the the wave of the music being carried. i.e. The amplitude is modulated by the music.

FM and ultra short wave usually means the same thing in layman terms. It means the broadcast radio transmitted at the frequency within the ultra short wave frequency range - 88Mhz to 108Mhz) and modulated using FM (Frequency Modulation).

Ultra short wave is a subset of a standard term called VHF - Very High Frequency) that describe frequency range of 30 Mhz to 300Mhz. See table below)

See table below.

Frequency modulation means the amplitude of the carrier wave is fixed all the time, but the frequency of the carrier wave will vary back and forth by a factor from the central frequency of the radio station you tuned into . This variation of frequency is according to the the wave of the music being carried. I.e. The frequency is modulated by the music.

Aviation communication uses AM but at the frequency range just above the FM radio ?

Pilots communicates with the airports at the Vivil aviation band - VHF 108Mhz to 136 MHz.
However, the voice of the pilots are put on the carrier wave using Amplitude Modulation (AM).
This is a good example to show that FM radio band, will sometimes be broadcasted using AM.

Types of modulation

AM

is the name given to the method to put an audio signal (voice/music) onto the radio wave, called Amplitude Modulation - fixed frequency with the amplitude of the wave shifting according to the volume of the music.

1. A standard radio wave of a fixed frequency (of that of the radio station) is first broadcasted. If no one music is played, the standard radio wave will have same amplitude (volume) all along, and you will hear silence from the radio receiver.
When the music starts playing and feed to the transmitter, then depending on the volume of the audio signal (voice/music), the radio wave will go up or down in amplitude (or volume).

This ups and downs in amplitude (volume is then translated by your radio receiver into audible sound coming form your headphone.

FM

is the name given to the method to put an audio signal (voice/music) onto the radio wave, called Frequency Modulation - fixed amplitude with the frequency of the wave shifting according to the volume of the music.

Like AM, 1. a standard radio wave of a base frequency (of that of the radio station) is first broadcasted. If no one music is played, the standard radio wave will have same frequency all along, and you will hear silence from the radio receiver.
When the music starts playing and feed to the transmitter, then depending on the volume of the audio signal (voice/music), the radio wave will shifts left and right in frequency within the frequency spectrum allocated to that radio station. E.g. RTHK2 may be broadcasting at 94.8Mhz +/-0.05Mhz. So, if music volume is low, it'll shift to 94.75Mhz, if music volume is high, it'll shift to 94.85Mhz.

What is LW, MW, SW1, SW2, Ultra SW ?

LW, MW, SW and FM are all descriptions of the frequency range used in radio broadcasting.

LW is short for Long Wave with a frequency range from 100Khz to 500Khz. It is a subset of the standard wireless terms we called LF (low frequency).
MW is short for Medium Wave with a frequency range from 0.5Mhz (500Khz) to 1.7 Mhz (1700Khz). i.e. MF (medium frequency)

SW is for Short wave, i.e. HF (high frequency)
SW1 is short for Short Wave One with a frequency range from 5Mhz to 10 Mhz.
SW2 is short for Short Wave Two with a frequency range from 11Mhz to 19 Mhz.

Ultra Shortwave is the range where FM radios are broadcasted. 70Mhz to 120Mhz.
i.e. VHF (very high frequency).

Band name	A	I	F	Example Uses
-----------	---	---	---	--------------

	U b r e v i a t i o n b e r	U b r e v i a t i o n b e r	U b r e v i a t i o n b e r	
Extremely low frequency [https://en.wiki dia.org/wiki/Extre mely_low_freque ncy]	E L F	3 - 3 0 H z 1 0 0 , 1 0 0 , 0 0 0 k m	Communication with submarines [https://en.wikipedia.org/wiki/Communication_with_submarines]	
Super low frequency [https://en.wiki dia.org/wiki/Supe r_low_frequency]	S L F	3 0 - 3 0 0 H z 1 0 , 0 0 0 - 1 , 0 0 0 k m	Communication with submarines	
Ultra low frequency [https://en.wiki dia.org/wiki/Ultra _low_frequency]	U L F	3 0 0 - 3 , 0 0 0	Submarine communication, communication within mines [https://en.wikipedia.org/wiki/Through_the_earth_mine_communications]	

			H Z 1 , 0 0 0 - 1 0 0 k m	
Very low frequency [https://en.wikipe dia.org/wiki/Very _low_frequency]	V L F	4	3 - 3 0 k H Z 1 0 0 - 1 0 k m	Navigation [https://en.wikipedia.org/wiki/Radio_navigation] , time signals [https://en.wikipedia.org/wiki/Radio_clock] , submarine communication, wireless heart rate monitors [https://en.wikipedia.org/wiki/Heart_rate_monitor] , geophysics [https://en.wikipedia.org/wiki/Geophysics]
Low frequency [https://en.wikipe dia.org/wiki/Low _frequency]	L F (L W)	5	3 0 - 3 0 0 k H Z 1 0 - 1 k m	Navigation, time signals [https://en.wikipedia.org/wiki/Radio_clock] , AM longwave [https://en.wikipedia.org/wiki/Longwave] broadcasting (Europe and parts of Asia), RFID [https://en.wikipedia.org/wiki/RFID] , amateur radio [https://en.wikipedia.org/wiki/Amateur_radio]
Medium frequency [https://en.wikipe dia.org/wiki/Medi um_frequency]	M F (M W " A M r a d i o ")	6	3 0 0 - 3 , 0 0 0 k H Z 1 , 0 0 0 - 1 0 0 m	AM [https://en.wikipedia.org/wiki/AM_broadcasting] (medium-wave) broadcasts, amateur radio, avalanche beacons [https://en.wikipedia.org/wiki/Avalanche_transceiver]
High frequency [https://en.wikipe dia.org/wiki/High _frequency]	H F (S W)	7	3 - 3 0 M H Z 1	Shortwave [https://en.wikipedia.org/wiki/Shortwave] broadcasts, citizens band radio [https://en.wikipedia.org/wiki/Citizens_band_radio] , amateur radio and over-the-horizon [https://en.wikipedia.org/wiki/Over-the-horizon] aviation communications, RFID [https://en.wikipedia.org/wiki/RFID] , over-the-horizon radar [https://en.wikipedia.org/wiki/Over-the- horizon_radar] , automatic link establishment [https://en.wikipedia.org/wiki/Automatic_link_establishment] (ALE) / near-vertical incidence skywave [https://en.wikipedia.org/wiki/Near_Vertical_Incidence_Skywave] (NVIS) radio communications, marine and mobile radio telephony [https://en.wikipedia.org/wiki/Marine_and_mobile_radio_telephony]

		0 – 1 0 m	
Very high frequency [https://en.wikipedia.org/wiki/Very_high_frequency]	V H F (" F M R a d i o ")	3 0 – 3 0 0 8 M H z 1 0 – 1 m	FM [https://en.wikipedia.org/wiki/FM_broadcasting] , television [https://en.wikipedia.org/wiki/Television] broadcasts, line-of-sight ground-to-aircraft and aircraft-to-aircraft communications, land mobile and maritime mobile communications, amateur radio, weather radio [https://en.wikipedia.org/wiki/Weather_radio]
Ultra high frequency [https://en.wikipedia.org/wiki/Ultra_high_frequency]	U H F	3 0 0 – 3 0 0 0 9 M H z 1 – 0 0 · 1 m	Television broadcasts, microwave oven [https://en.wikipedia.org/wiki/Microwave_oven] , microwave [https://en.wikipedia.org/wiki/Microwave] devices/communications, radio astronomy [https://en.wikipedia.org/wiki/Radio_astronomy] , mobile phones [https://en.wikipedia.org/wiki/Mobile_phone] , wireless LAN [https://en.wikipedia.org/wiki/Wireless_LAN] , Bluetooth [https://en.wikipedia.org/wiki/Bluetooth] , ZigBee [https://en.wikipedia.org/wiki/ZigBee] , GPS [https://en.wikipedia.org/wiki/GPS] and two-way radios such as land mobile, FRS [https://en.wikipedia.org/wiki/Family_Radio_Service] and GMRS [https://en.wikipedia.org/wiki/GMRS] radios, amateur radio, satellite radio [https://en.wikipedia.org/wiki/Satellite_radio] , Remote control Systems, ADSB [https://en.wikipedia.org/wiki/Automatic_dependent_surveillance_%E2%80%93%93_broadcast]
Super high frequency [https://en.wikipedia.org/wiki/Supremely_high_frequency]	S H F	3 – 3 0 0 G H z 1 0 0 0 – 1 0 m m	Radio astronomy, microwave devices/communications, wireless LAN, DSRC [https://en.wikipedia.org/wiki/Dedicated_short-range_communications] , most modern radars [https://en.wikipedia.org/wiki/Radar] , communications satellites [https://en.wikipedia.org/wiki/Communications_satellite] , cable and satellite television broadcasting, DBS [https://en.wikipedia.org/wiki/Direct-broadcast_satellite] , amateur radio, satellite radio [https://en.wikipedia.org/wiki/Satellite_radio]
Extremely high frequency [https://en.wikipedia.org/wiki/Extremely_high_frequency]	E H F	3 0 – 3 0 0 0 1 G H z 1 0 – 1 m	Radio astronomy, high-frequency microwave radio relay [https://en.wikipedia.org/wiki/Microwave_radio_relay] , microwave remote sensing [https://en.wikipedia.org/wiki/Remote_sensing] , amateur radio, directed-energy weapon [https://en.wikipedia.org/wiki/Active_Denial_System] , millimeter wave scanner [https://en.wikipedia.org/wiki/Millimeter_wave_scanner] , wireless LAN (802.11ad)

Terahertz [https://en.wiki- pedia.org/wiki/Tera- hertz_radiation] or Tremendou- sly high frequency [https://en.wike- pedia.org/wiki/Trem- endously_high_fr- equency]	T	1	3	Experimental medical imaging to replace X-rays, ultrafast molecular dynamics, condensed-matter physics [https://en.wikipedia.org/wiki/Condensed-matter_physics] , terahertz time-domain spectroscopy [https://en.wikipedia.org/wiki/Terahertz_time-domain_spectroscopy] , terahertz computing/communications, remote sensing [https://en.wikipedia.org/wiki/Remote_sensing] ,
	H	2	0	
	Z	0	0	
	O	-	3	
	R	T	,	
	T	H	0	
	F	0	0	
		0	0	
		G		
		H		
		Z	1	
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		m		

Posted 6th July 2013 by Billy

0 Add a comment

4th July 2013

Sun bath for my crystal radios

Last Sunday I went to the gold coast beach in Hong Kong.
It's quite close to the FM radio transmission station.
You can listen to the FM radio from the battery free FM crystal radio just by raising the antenna.

I've also took this chance to take a good photo of all the different types of crystal radios I made.



[http://3.bp.blogspot.com/-vtr2eymKSoM/UdVspfyA98I/AAAAAAAAABRc/ONGIXklaRy8/s442/Screen+Shot+2013-07-01+at+5.57.45+PM.png]




[http://2.bp.blogspot.com/-x9uRI5r7_zl/UdVspF56XF/AAAAAAAAABRQ/pUrJpD1wQJY/s513/Screen+Shot+2013-07-01+at+5.58.54+PM.png]



[<http://1.bp.blogspot.com/-LRdBXnct1pU/UdVspShf/AAAAAAAAABRU/8zb8Wn46Dlk/s469/Screen+Shot+2013-07-01+at+5.59.50+PM.png>]

Links to my chinese blog

1. 雨伞矿机 - <http://www.crystalradio.cn/thread-389699-1-1.html> [<http://www.crystalradio.cn/thread-389699-1-1.html>]
2. 馬甲矿机 - <http://www.crystalradio.cn/thread-414334-1-1.html> [<http://www.crystalradio.cn/thread-414334-1-1.html>]
3. 背包矿机 - <http://www.crystalradio.cn/thread-397792-1-1.html> [<http://www.crystalradio.cn/thread-397792-1-1.html>]
4. 帽子矿机 - <http://www.crystalradio.cn/thread-390223-1-1.html> [<http://www.crystalradio.cn/thread-390223-1-1.html>]
5. FM 矿机 - 參照 bd1234567 老師的創作 <http://www.crystalradio.cn/forum...read&tid=220240> [<http://www.crystalradio.cn/forum.php?mod=viewthread&tid=220240>]
6. FM 大环矿机 - 參照梁老師的創作 <http://www.crystalradio.cn/forum.php?mod=viewthread&tid=73497> [<http://www.crystalradio.cn/forum.php?mod=viewthread&tid=73497>]
7. AM / FM 多用途矿机 - <http://www.crystalradio.cn/thread-420838-1-1.html> [<http://www.crystalradio.cn/thread-420838-1-1.html>]

Posted 4th July 2013 by [Billy](#) 0 Add a comment

3rd July 2013

The simplest FM Crystal Radio

The simplest battery-free FM Crystal Radio.

Make the world's simplest battery-free FM crystal radio

Only consists of two high frequency diode: 1N34A or ISS86 or ISS106.

A 100K Resistor.

An 1.8M antenna.

And a crystal or high impedance earphone

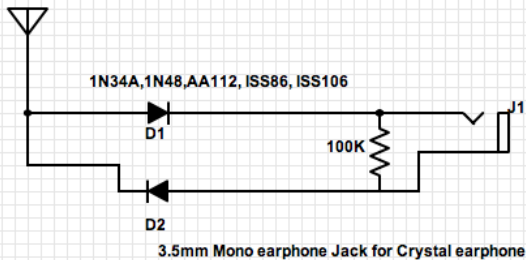


[\[http://1.bp.blogspot.com/-x9lr6oLJ9z8/UdQ_IBNismI/AAAAAAAABQE/pfbpj7x0Azs/s1600/IMG_2607.JPG\]](http://1.bp.blogspot.com/-x9lr6oLJ9z8/UdQ_IBNismI/AAAAAAAABQE/pfbpj7x0Azs/s1600/IMG_2607.JPG)

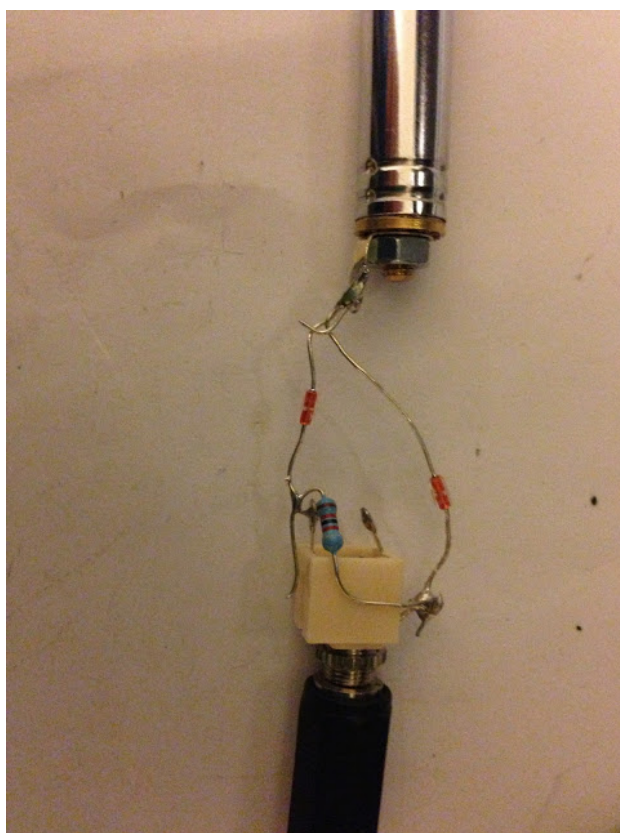
Refer to this circuit diagram

The simplest FM Crystal Radio Circuit - <http://billydiy.blogspot.hk>

Antenna - Extendable Radio 1.8 meter. That also serves as tuning



[<http://2.bp.blogspot.com/-G9onfk5x8FA/UdRDYhFFyAI/AAAAAAAAABRA/mtiP8wFX78E/s639/Screen+Shot+2013-07-03+at+11.28.54+PM.png>]



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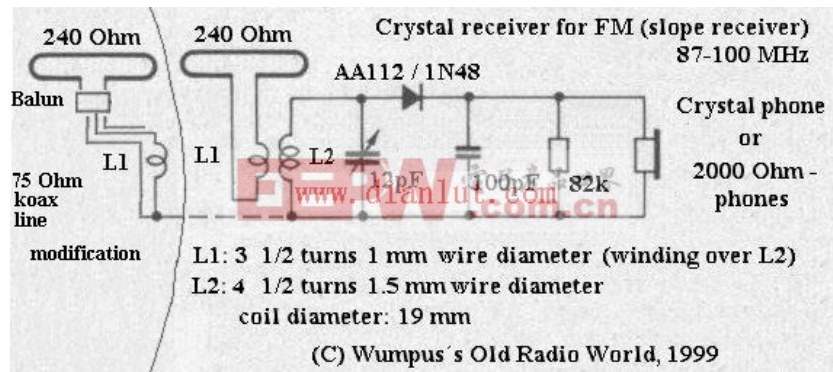
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Posted 3rd July 2013 by Billy

1 View comments

28th June 2013

Other Crystal Radio Circuits



[http://1.bp.blogspot.com/-uELBKMZo-I/Uc2DPHecvZI/AAAAAAAAABK8/AgJ9Anli42s/s573/2_101224175651_1.JPG]

Posted 28th June 2013 by Billy

0 Add a comment

28th June 2013

Wearable Battery-Free Jacket Crystal Radio

Build an always wearable Crystal Radio by winding a coil at the inner linings of your jacket. You can walk with it, run with it, ride bicycle with it and continue to listen to radio.



[http://2.bp.blogspot.com/-tdd3IUhW9JM/Uc2ZTDN5LfI/AAAAAAAAABNw/jmid0PV_fmU/s1600/IMG_2383.JPG]



[http://4.bp.blogspot.com/-h6QYObgCJhE/Uc2ZTJbbUnI/AAAAAAAAABNo/I3EgotNHT8U/s1600/IMG_2384.JPG]



[http://2.bp.blogspot.com/-jgONTqzWly8/Uc2ZTPsMk6I/AAAAAAAABNk/9NWTlo5UrWE/s1600/IMG_2385.JPG]



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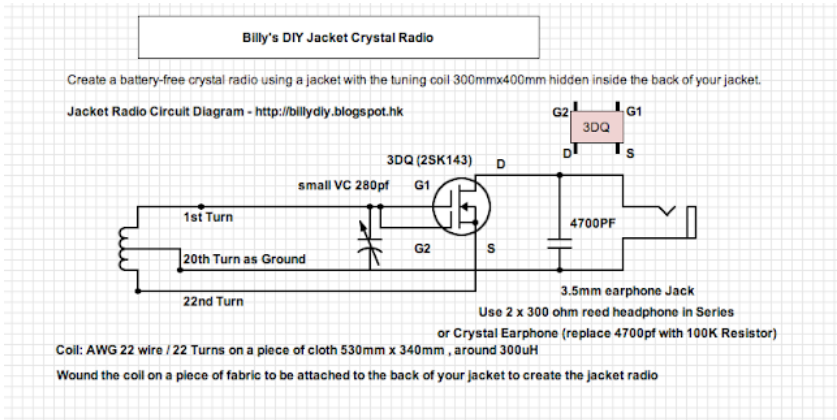
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[http://4.bp.blogspot.com/-VKigLEZD8SU/Uc2ZU6EMTbI/AAAAAAAAABOQ/CwqnV6A_WPQ/s267/Screen+Shot+2013-06-04+at+8.59.54+PM.png]



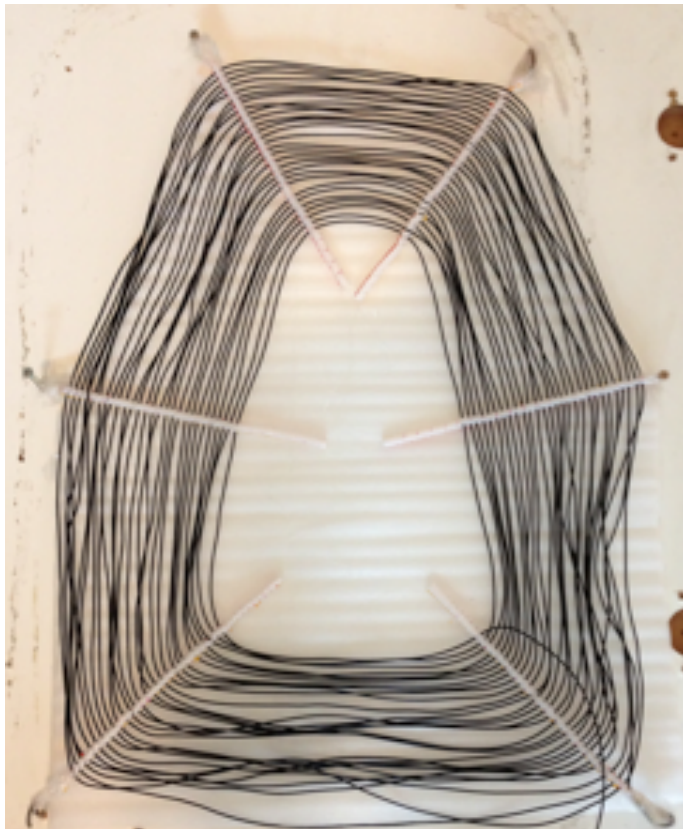
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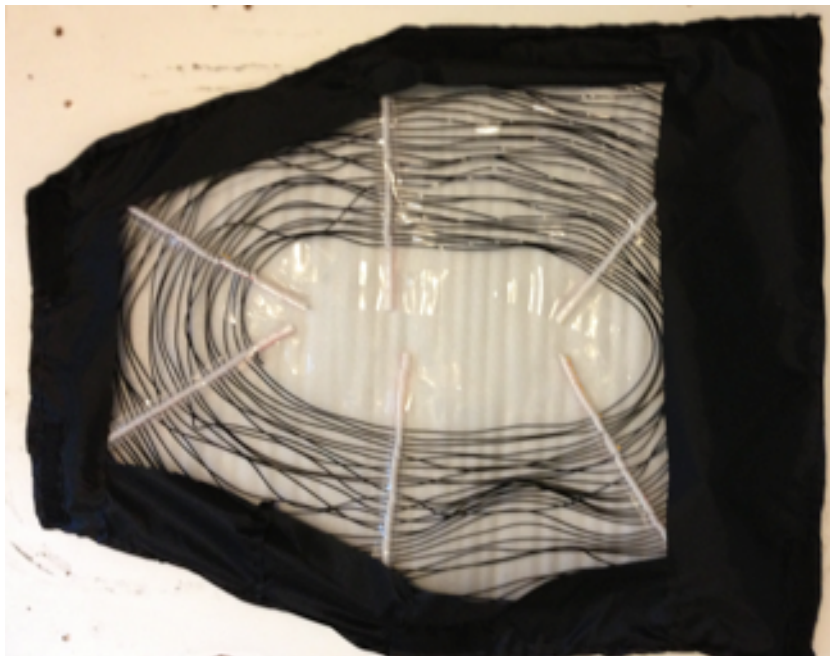
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[<http://4.bp.blogspot.com/-zk7AhAeqsXQ/Uc2ZVi2Z3kl/AAAAAAAAABOY/KH8dma6pRZ0/s235/Screen+Shot+2013-06-04+at+9.00.25+PM.png>]



[<http://1.bp.blogspot.com/-9pm2x80WsdA/Uc2ZViDK6xl/AAAAAAAAABOg/ReHQwKYY8RY/s294/Screen+Shot+2013-06-04+at+9.00.47+PM.png>]



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Name IMC 2382 IDC

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[<http://2.bp.blogspot.com/-holyCfigwDk/Uc2ZXIFdhxI/AAAAAAAAABPQ/juheK5d07x4/s475/Screen+Shot+2013-06-04+at+9.09.30+PM.png>]



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Great Deal At Oakland Ca!! in Oakland...

\$499,000



Hot Off Market Way Below Market...

\$140,000

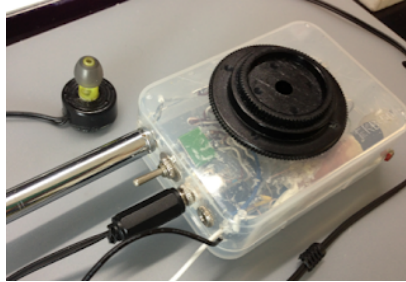


Hot Deal At Oakland Ca!!! in Oal

\$650,000

28th June 2013

AM/FM/Loop Crystal Radio

[[http://3.bp.blogspot.com/-](http://3.bp.blogspot.com/-W5MoCilQOU/Uc2WU1CTbbI/AAAAAAAAABNA/hH64_FNxMpo/s436/Screen+Shot+2013-06-23+at+12.06.23+PM.png)[W5MoCilQOU/Uc2WU1CTbbI/AAAAAAAAABNA/hH64_FNxMpo/s436/Screen+Shot+2013-06-23+at+12.06.23+PM.png](http://3.bp.blogspot.com/-W5MoCilQOU/Uc2WU1CTbbI/AAAAAAAAABNA/hH64_FNxMpo/s436/Screen+Shot+2013-06-23+at+12.06.23+PM.png)]

Build a multifunction battery free crystal radio to listen to either AM or FM radio.

You can also use the same radio to connect to a bigger loop coil to get stronger signal for the AM radio instead of relying on the smaller AM coil inside the radio.

Parts you will need:

A Diode that works in high frequency (200Mhz or above, e.g. AA112, 1N34A, 1N48, 1SS86 or 1SS106.

A Diode that work in AM frequency e.g. 1N34A, 1N60, BAT85.

A quadruple PVC Variable capacitor with one end for 2x 20pf, the other end for 2x 140pf.

50pf and 180pf fixed ceramic capacitor

100K 1/4W resistor

33uH Choke coil.

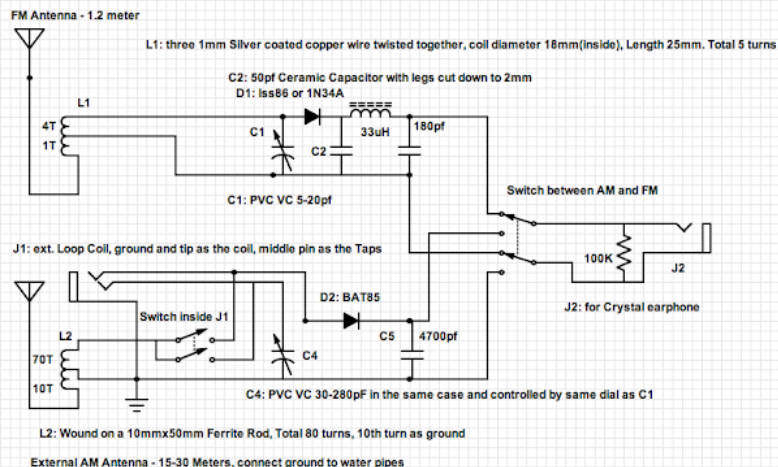
AM radio coil - ferrite rod

3.5mm mono headphone jack

3.5mm stereo headphone jack with internal switches (for selecting whether to use the external big loop or the internal coil for AM.

A 2 by 3 switch to select AM or FM.

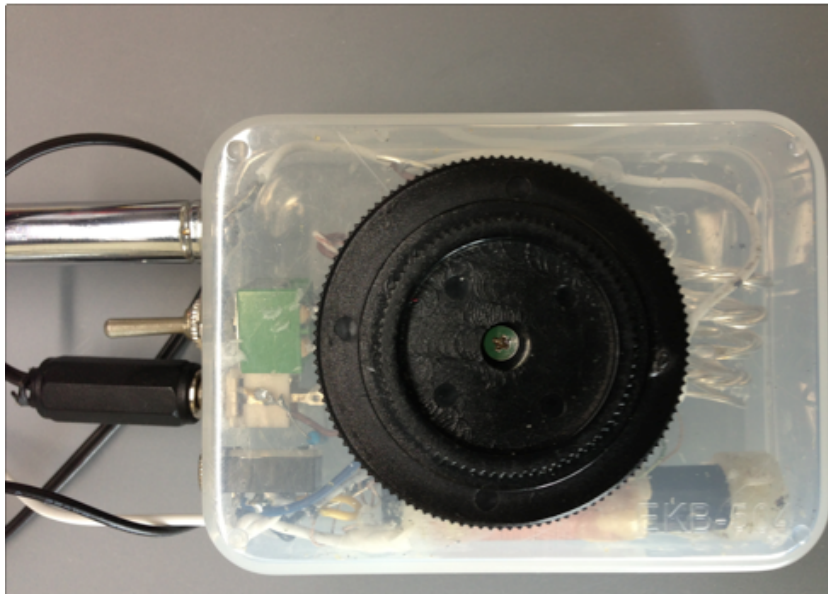
A high impedance 4K Ohm earphone or a crystal earphone.

AM/FM/Big Loop Multipurpose Crystal Radio Circuit - <http://billydiy.blogspot.hk>[<http://2.bp.blogspot.com/--ZAhsy2SRko/Uc2WUu2Gz6I/AAAAAAAAABM8/czIHQF1iPzI/s855/Screen+Shot+2013-06-23+at+11.22.21+AM.png>]

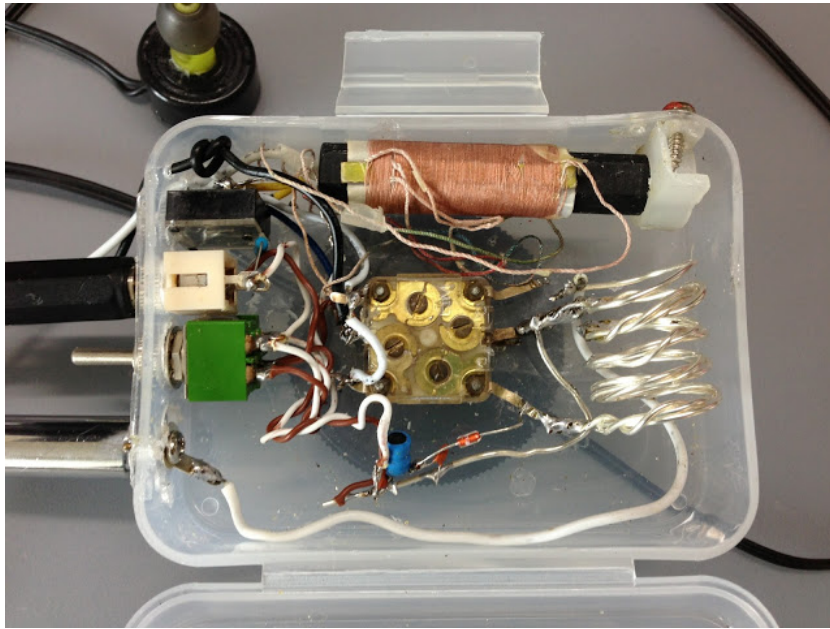
To connect to external Loop coil for AM reception instead of using the internal AM coil, connect 3-color crocodile camp to the 3.5mm Stereo jack - white for the tuning, black for ground, yellow for the decoder diode.



[<http://3.bp.blogspot.com/-df0Gv1TiXME/Uc2WTw3VL8I/AAAAAAAAABMs/hJaPbNYh4uQ/s415/Screen+Shot+2013-06-23+at+1.19.26+PM.png>]



[<http://2.bp.blogspot.com/-966mXwGZozE/Uc2WVmB2ILI/AAAAAAAAABNY/P2KdoMFVIR0/s489/Screen+Shot+2013-06-23+at+12.07.13+PM.png>]



[http://1.bp.blogspot.com/-UURJiV8VfBY/Uc2WTLqcLFI/AAAAAAAAABMc/q9_Y7C47Zb8/s1600/IMG_2521.JPG]

Posted 28th June 2013 by [Billy](#)

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28th June 2013

FM Crystal Radio

Build a battery free FM crystal radio using 1mm silver plated copper wire



[http://2.bp.blogspot.com/-LyTLmJ0D5ao/Uc2SwAO-02I/AAAAAAAABL4/jkHYmvlmcE/s1600/IMG_2535.JPG]

This FM radio runs without battery and you can listen to FM radio by just placing this close to your window. If reception is not good, you can attach an external FM antenna (or with antenna amplifier), instead of using the 1.2M radio antenna.

Parts you will need:

A Diode that works in high frequency (200Mhz or above, e.g. AA112, 1N34A, 1N48, 1SS86 or 1SS106.

A 0-12 pf AIR Variable capacitor - you can get a 0-22pf one, then remove all the copper plates and leave just 4.

50pf and 180pf fixed ceramic capacitor

100K 1/4W resistor

33uH Choke coil.

Silver plated copper wire 1mm diameter

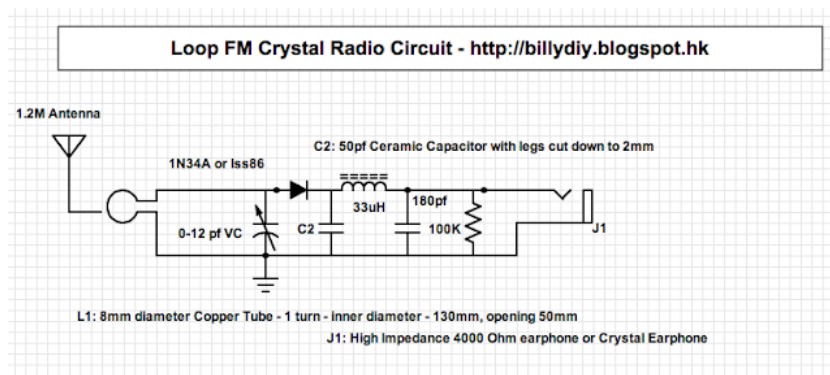
1.2meter radio antenna.

3.5mm mini headphone jack

A high impedance 4K Ohm earphone or a crystal earphone.



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Posted 28th June 2013 by Billy

4

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28th June 2013

Battery Free Loop FM Crystal Radio

Battery Free Loop FM Radio using an 8-mm diameter copper tube.

This FM radio runs without battery and you can listen to FM radio by just placing this close to your window. If reception is not good, you can attach an external FM antenna (or with antenna amplifier), to the Loop at the point 1/3 of the loop close to the ground.

Parts you will need:

A Diode that works in high frequency (200Mhz or above, e.g. AA112, 1N34A, 1N48, 1SS86 or 1SS106.

A 0-12 pf AIR Variable capacitor - you can get a 0-22pf one, then remove all the copper plates and leave just 4.

50pf and 180pf fixed ceramic capacitor

100K 1/4W resistor

33uH Choke coil.

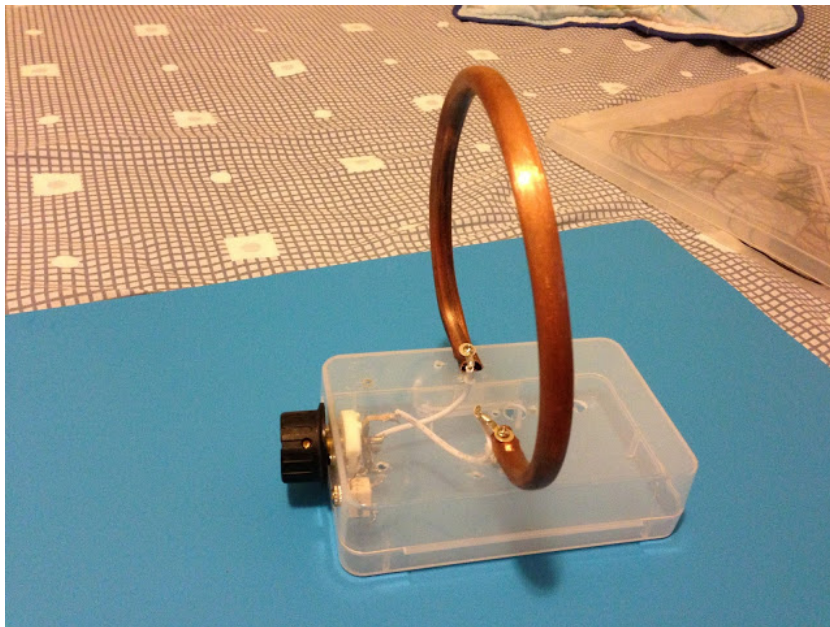
3.5mm mini headphone jack

A high impedance 4K Ohm earphone or a crystal earphone.

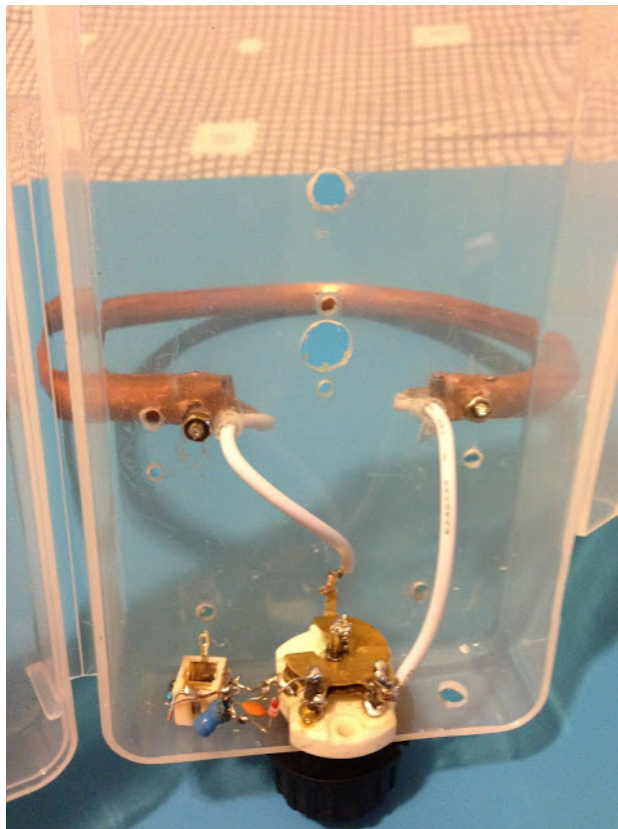
Some wires.



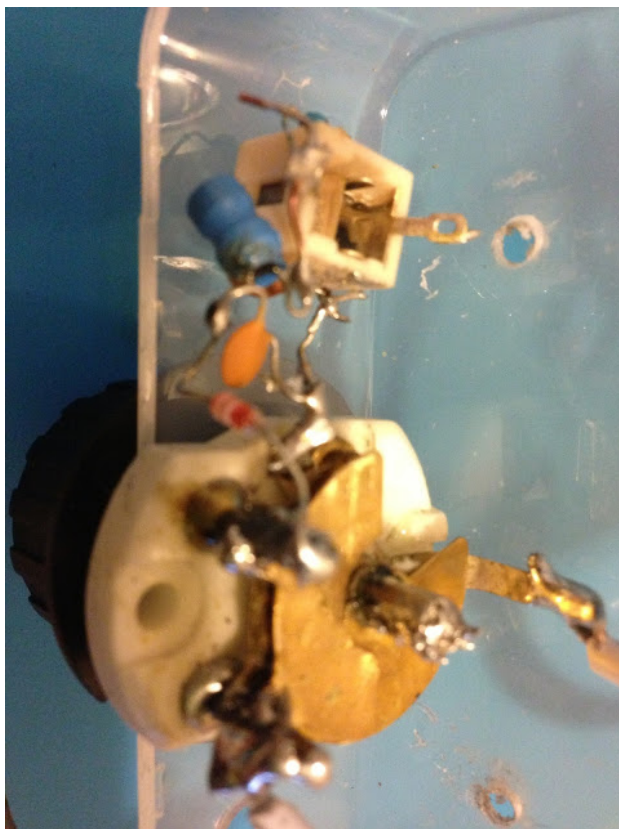
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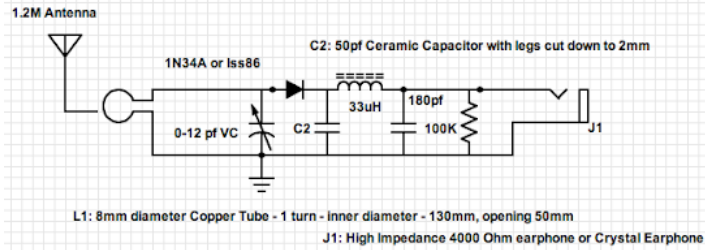


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[http://1.bp.blogspot.com/-ONsnEMeXv-g/Uc2EWEFWNnI/AAAAAAAAABLo/ap0dwwE1PKY/s1600/IMG_2531.JPG]

Loop FM Crystal Radio Circuit - <http://billydiy.blogspot.hk>



[http://1.bp.blogspot.com/-84ZQcpL-iDM/Uc2DeEbsVzI/AAAAAAAAABLA/R_rFIJDIWn8/s763/Screen+Shot+2013-06-28+at+8.36.46+PM.png]

Posted 28th June 2013 by Billy

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18th May 2013

Make a variable capacitor out of a CD case and a CD

Make a variable capacitor out of a CD and a CD case.



[http://2.bp.blogspot.com/-fjTMYdnkRSQ/UZgpVKIgr8I/AAAAAAAAABKY/BgEkJoISM4M/s1600/IMG_1865.jpg]

Use CD that is transparent (without the magnetic/metal coating).



[http://1.bp.blogspot.com/-Izm_2BkhKVU/UZgmsAytz2I/AAAAAAAAABI4/Rm2qMOOijil/s1600/IMG_1855.JPG]

Cut a circular piece of aluminium paper foil (even better if you can use copper foil), a little bit smaller than the size of the CD. Then cut it in half.
Paste one half of the aluminium paper foil onto the bottom of the CD case.

Paste the other half onto one side of the CD.
Tape wires onto the aluminium paper.



[\[http://4.bp.blogspot.com/-AhSF6NvwA5A/UZgmsA2IhI/AAAAAAAAABi8/Im5waOAdzDU/s1600/IMG_1858.JPG\]](http://4.bp.blogspot.com/-AhSF6NvwA5A/UZgmsA2IhI/AAAAAAAAABi8/Im5waOAdzDU/s1600/IMG_1858.JPG)

Cut a circular piece of thin plastic film (as soon as you can find, yet strong enough to withstand the pressure and still insulate the aluminium foil from one another).

Paste the plastic film onto the bottom of the CD case on directly top of the aluminium paper foil.

Put the CD on top with aluminium paper facing down).

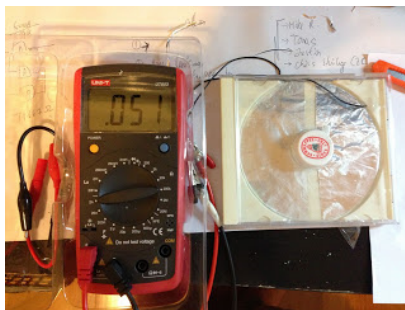
Paste a plastic bottle caps on the centre of CD to function as the knob to turn the variable capacitor.

In front of the CD case, open a hole slightly larger than the plastic caps.
on the CD case. Close the CD case.

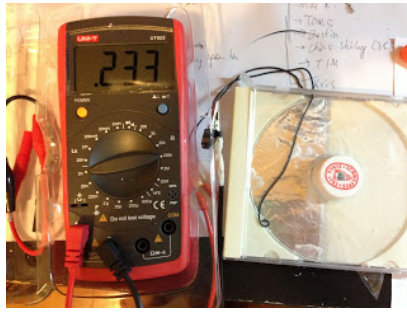


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Test the CD Variable Capacitor using a Capacitance Meter. Mine can have a capacitance from 51pf to 233pf when turning the knob. You may be able to do better by pressing the CD and the CD case firmer together. Or replace the aluminium foil with copper foil.



[\[http://4.bp.blogspot.com/-5bFY1MxzH1w/UZgonsTLu7I/AAAAAAAAABKI/X4ureG3Esss/s1600/IMG_1860.jpg\]](http://4.bp.blogspot.com/-5bFY1MxzH1w/UZgonsTLu7I/AAAAAAAAABKI/X4ureG3Esss/s1600/IMG_1860.jpg)



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[ocCLqbtDhVQ/UZgon6TKWGI/AAAAAAAAABKM/9nSD9nMt6a4/s1600/IMG_1862.jpg](http://4.bp.blogspot.com/-ocCLqbtDhVQ/UZgon6TKWGI/AAAAAAAAABKM/9nSD9nMt6a4/s1600/IMG_1862.jpg)]

Posted 18th May 2013 by [Billy](#)

2 View comments

19th April 2013

Backpack Crystal Radio

I was trying to bring the crystal radio out of the studio and into daily life.

However, whenever I use my umbrella crystal radio or hat crystal radio, people would give me a strange look. If we can hide a 300mmx400mm rectangular coil inside the backpack, we can build a backpack crystal radio and listen to music as you travel.

And I did it! Check out this YouTube video:

<http://www.youtube.com/watch?v=MbV9e09-Dxw> [<http://www.youtube.com/watch?v=MbV9e09-Dxw>]

Although the volume of the radio is smaller than an umbrella, but you can still listen to some of the local radio stations clearly.

I can listen to the crystal radio every day on my way to work. The radio is loud enough and even louder in locations with a better radio reception.

Remember to leave me some comments (at the comment box) at the bottom of this if you have read this blog.

Warning: If you are going on a flight or to a sensitive area, please remember to remove the coil from the backpack before going, otherwise you may not be able to board the aircraft.

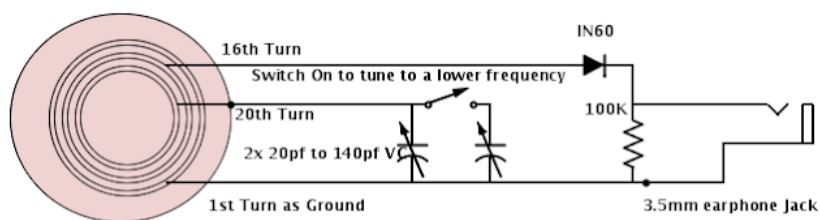


[http://4.bp.blogspot.com/-VY4RfayhLZ4/UXFleGq43yl/AAAAAAAAABBo/VgW_NXnFnTA/s1600/Screen+Shot+2013-04-19+at+8.33.07+PM.png]



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Circuit Diagram

Backpack Radio Circuit Diagram – <http://billydiy.blogspot.hk>

Coil: use any soft insulated wire (e.g. AWG 22). Wound a total of 20 turns on a box 300mm x 400mm

Then put the coil inside the cover of the backpack

See further details on how to build the backpack radio at <http://billydiy.blogspot.hk>

[<http://1.bp.blogspot.com/-Q3ueJXl4Ak4/UXFleEDQC-I/AAAAAAAAABBs/nzQDabrMuzw/s1600/Screen+Shot+2013-04-19+at+7.28.36+PM.png>]

Components you will need.

A backpack 300x400 mm or more, the larger the diameter, the more sensitive the radio.

The following instructions assume a 300x400 mm backpack.

Diode IN60, IN34A,

100K resistor,

40pf to 280PF variable capacitor (you can get it from an old radio)

3.5mm headphone jack,

18 meters of thin wire

A plastic battery case (those for two 2A Batteries) as a case for the crystal radio.

Crystal headset or 2K ohms or more high-impedance headphones. If you do not have one, follow instructions here to make one.

<http://billydiy.blogspot.hk/2013/03/build-crystal-earphone-for-crystal.html>

How to make it

A. Backpack Antenna

1. Found a box the same size as the backpack. Then wind the wires around it to make the coil. A total of 20 turns are required. Then create a tap for the 16th turn. When finished, use tapes to tie the coil together. The coil inductance should be about 300uH. Then line-to-line capacitance is around 18PF. It will match well with a 20 pF to 280pF variable capacitor to tune into both radio stations at the low-end (531kHz) and the high-end (1453Khz).

2. Cut the front cover of the backpack to create an opening to install the coil.

3. Cut some more holes inside the backpack, to pass the wires inside the backpack to the side of the backpack.

4. Create a small side pocket to hold the radio with some cloth and zippers

5. Put the coil inside the opening created at the front cover of the backpack.

6. Pass the wires from the coil through the opening to the side pocket of the backpack.

7. Connect the the 1st turn to terminal 1, 16th turn to terminal 2, 20th turn to terminal 3.



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B. Crystal radio (without coil).

1. Drills holes in the plastic 2A battery box to install the headphone jack, variable capacitor and to pass the terminal wires.
2. Get the headphone jack and a variable capacitor installed, tighten the screws.
3. Refer to the circuit diagram and photos, weld the parts together.
4. The switch lead is connected to the two stator variable capacitor used to select the low-end or high-end radio.
5. Connect the ground wire from the headphone jack to terminal 1.
Connected diode to terminal 2.
Connect the variable capacitor stator to terminal 3.



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C. Connect the backpack antenna and the Crystal Radio together.

1. Attach the crystal radio to the side pocket of the backpack with a sticky tape.
2. Connect the terminal from the crystal radio to that of the backpack coil.
3. Plug the Crystal headphones into the headphone jack.
4. Place the backpack radio near a window or get to the streets to find an open space.

This backpack radio does not require a ground/earth connection, so you are free to walk on the street.

Align the backpack radio with the direction of the radio transmitting stations, slowly swing the backpack sideways to find the right location for best radio reception. At the same time, turn the knob of the variable capacitor tunes to radio stations. If you are located at a wide open space, you should be able to receive signals from a radio station. And then continue to adjust the angle to find the best reception.

You also can turn the switch on or off to select the low-end or high-end radio stations.



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Posted 19th April 2013 by [Billy](#)

[1](#) View comments

12th April 2013

Battery-free Loud Huge Pipe Crystal Radio

Imagine building a huge crystal radio using PVC pipes as the wiring frame that is loud enough to drive the speaker.



[<http://4.bp.blogspot.com/-1keQ1A93uUI/UWrmRcNMhpl/AAAAAABAAo/0fRnzzDFLQw/s1600/Screen+Shot+2013-04-15+at+1.09.32+AM.png>]

I saw this in the discussion forum in crystalradio.net.cn and try to build it with my own design.

This is a huge crystal radio 1.5 meter high, .3 meter wide with the coil wound on the plastic pipes you used to run electric wires into the walls. The pipes are exceptionally cheaper than I thought, only HKD 6 per 3 meters.

Setting up the framework takes one hour, and winding the coil another hour.

After all the hard work, I did it! The audio output level is two times louder than the umbrella radio and you can really drive the speaker. It's so loud that I end up adding a volume control to lower down the sound so I can listen to music while getting to sleep.

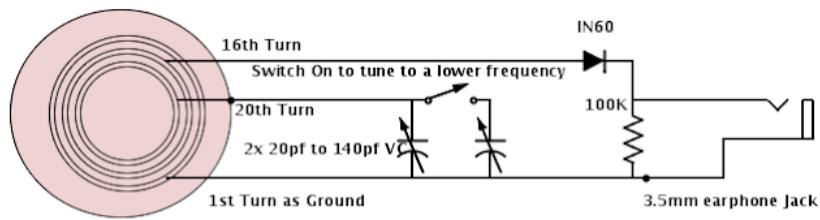
Checkout this youtube video:

<http://www.youtube.com/watch?v=difYPuzWj4M> [<http://www.youtube.com/watch?v=difYPuzWj4M>]

You can follow the instructions below to make this.

Remember to leave me some comments (at the comment box) at the bottom of this if you have read this blog.

CIRCUIT DIAGRAM

Backpack Radio Circuit Diagram - <http://billydiy.blogspot.hk>

Coil: use any soft insulated wire (e.g. AWG 22). Wound a total of 20 turns on a box 300mm x 400mm
 Then put the coil inside the cover of the backpack
 See further details on how to build the backpack radio at <http://billydiy.blogspot.hk>

[<http://1.bp.blogspot.com/-Q3ueJXI4Ak4/UXFleEDQC-I/AAAAAAAAABBs/nzQDabrMuzw/s1600/Screen+Shot+2013-04-19+at+7.28.36+PM.png>]

Parts you'll need.

1. Diode IN60, or IN34A
2. Variable Resistor 100K type B (for volume control).
3. 30pf to 360pf Variable Capacitor (you can get it from an old radio if you cannot buy it),
4. 2.5mm earphone jack,
5. 3.5 meter of thin wires in three different colours (black for earth, red for antenna, orange for detector)
6. Three crocodile clamps of the same colours.
7. A transparent plastic case for the crystal radio. 60mmx40mmx20mm
8. A crystal earphone. If you do not have it, you can buy it from amazon or e-Bay (around HKD 100 including all the handling fees) or make one yourselves at HKD 10 following the instructions from my other blog posting here:

[How to make a crystal earphone for crystal radios](http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062) [<http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062>]



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9. 70 meters of any insulated wires. I used the AWG 22 plastic wire. You can also use AWG 26 which is thinner and lighter. However, the thicker the wire, the more radio wave you capture and the higher sensitivity and higher audio output.



[http://2.bp.blogspot.com/-rYyEBQEY_B4/UVmUKnniVil/AAAAAAAAA0Q/ua6obT96AQ/s1600/IMG_1200.JPG]

You can get most of these from electronic shops in Shamshupo, except the variable capacitor. You can easily buy some old recycled walkman with radios for HKD20-50 from the hawkers in Ip Liu Street in Sham Shui Po. The other way is to go to taobao.com to buy them online and ship to HK. The goods is RMB 5, but the shipping fees is minimum RMD 30, so not worth it unless you buy in great quantity. For the Crystal Earphone, it's very hard to buy nowadays. Refer to my other post to make one yourselves. [DIY Crystal Earphone for Crystal Radios](http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html) [<http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html>]

From the Hardware store:

10. Buy 3 x 20mm diameter PVC pipes , each 3 meters long - around HK\$6 each (ask the shop keeper to cut it in half so you will have 6 x 1.5meter pipes, easier to carry home).
11. 8 x L shape PVC pipe joints for 20mm pipes - around \$1.5 each
12. 8 x T shape PVC pipe joints for 20mm pipes - around \$1.5 each



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TOOLS

1. Solder Iron
2. Saw
3. White Tapes

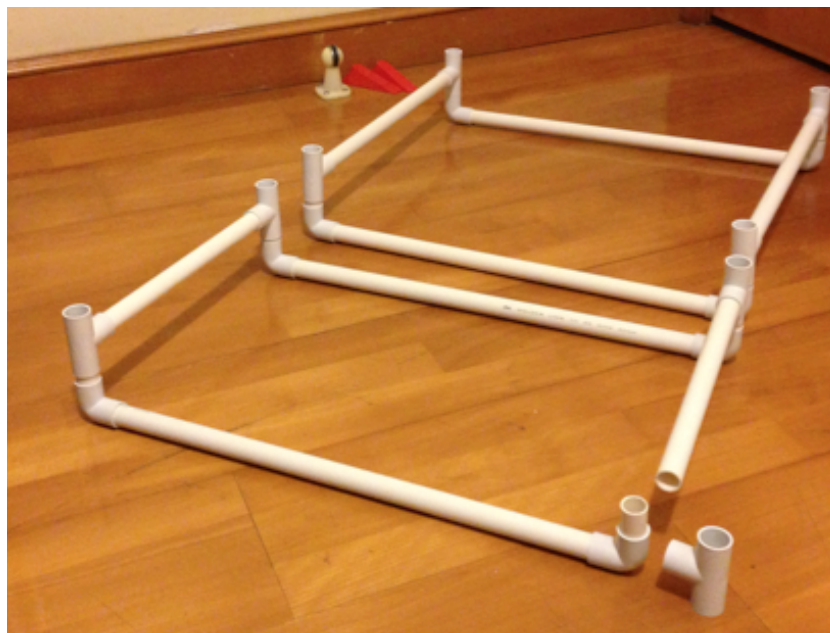
HOW TO MAKE IT.

A. Create the Hug Pipe Antenna

1. First build the wiring frame:

- Use the saw cut out the pipes into the following pieces:
 - 4 x 1.5 meter pipes
 - 4 x 470mm pipes.
 - 4 x 270mm pipes
 - 8 x 35mm pipes for connecting T-Joints and L-joints together
- connect one 470mm pipe to a L-Joint then to a 35mm pipe then to an T-joint. Then connect the 270mm pipe to the T-Joint.
- Repeat the above to create the base and the top as below.

Dynamic Views theme. Powered by [Blogger](#).



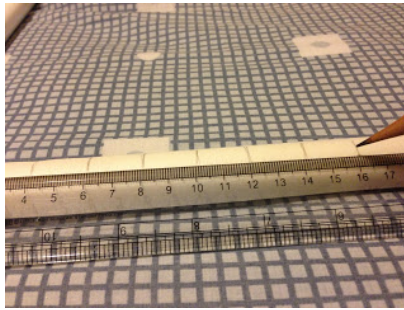
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- Now insert the 4 x 1.5 meter pipes into the T-joints (connecting the square base with the square tops).
- Fasten the joins by applying pressure.



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2. Put the white tapes onto the 4 edges of the base and the top of the frame. Then put a mark on the tape every 20mm. This is the separation between coils.



[http://1.bp.blogspot.com/-60fMfQJ6aNk/UWgDgscyt1I/AAAAAAAAA_k/MFIUQpX1B1g/s1600/IMG_1310.JPG]

3. Put another tape onto the first tape, for sticking the wire in place.
4. Start winding the coil. Lift up the outer tape, put the wire at the places that we marked, and stick the outer tape to hold the wire, then continue the wind all the 17 turns.



[http://4.bp.blogspot.com/-1LAX7awksM/UWgDnpkzU5I/AAAAAAAAA_s/lwkKt3quUS4/s1600/IMG_1311.JPG]

5. After winding is done, create the tabs by cutting out the jacket of the wire and expose the copper inside for every turn. At around 80mm above the base.
6. If you have a inductance meter, measure the inductance of the whole coil. It should be close to 300 uH. As shown below, the inductance of the coil is around 294 uH



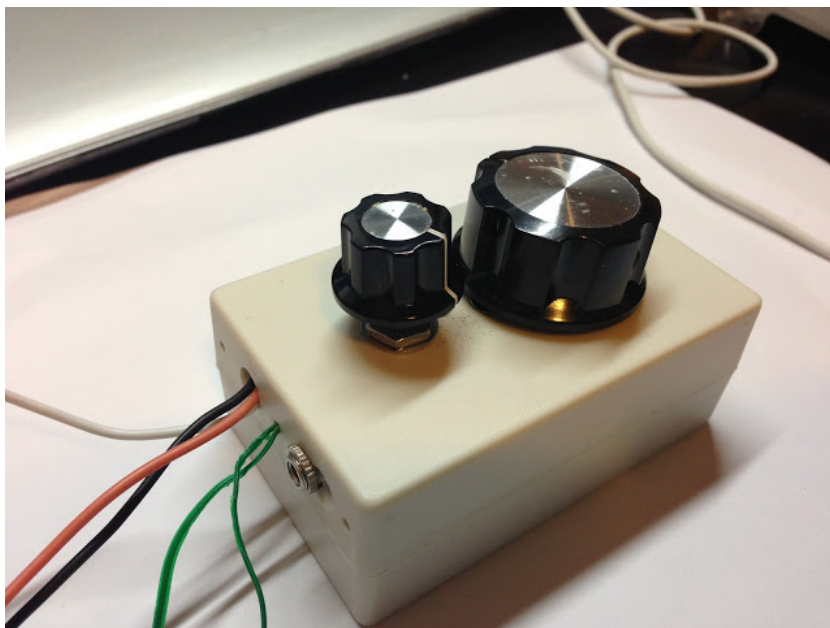
[http://2.bp.blogspot.com/-1hLmBI9EIf8/UWfwOGp-Oxl/AAAAAAAAA-M/eJV6TJ92p1Y/s1600/IMG_1280.JPG]

B. Make the crystal radio (without the coil).

1. Drill holes on the plastic case to fit the earphone jacks, variable capacitor knobs, and the variable resistor knobs, and one more hole to pass the wires for the crocodile clamps, and one more hole for a thin wire to hang the box.
2. Mount the earphone jacks, the variable capacitor and the variable resistor onto the case and fasten the screws.
3. Refer to the circuit diagram and the real life wiring photo, solder the parts together.
4. Connect a black wire to the ground of the Jack and connect the other end to a black crocodile clamp.
5. Connect a white wire to the tip C1 of the variable capacitor.
6. Connect an orange wire to the diode and connect the other end to a yellow crocodile clamp.



[http://2.bp.blogspot.com/-KB-_5OFCxEg/UWf4MAx0hLI/AAAAAAAAA-w/sKXMPRWu6zk/s1600/Screen+Shot+2013-04-12+at+8.03.34+PM.png]



[http://4.bp.blogspot.com/-zpN-V5FYIGk/UWf3ymcjDJI/AAAAAAAAA-o/mTmsqaNg290/s1600/IMG_1301.JPG]

C. Put the Huge Pipe Antenna and the Crystal Radio together.

1. Stand the huge pipe radio next to the window. Use some boxes to raise the frame at least 80mm above any concrete or steel platforms. Otherwise, all the radio signal will be drained to the earth through these concrete or steel frames of your window.
2. Connect black crocodile clamp from crystal radio (for ground) to the tab of the turn 0 (beginning of the coil).
3. Connect the red crocodile clamp (for tuning) to the tab of the last turn (end of the coil).
4. Connect the yellow crocodile clamp (for detector) to the tab of the 14th turn.
5. Plug a crystal earphone to the earphone jack of the radio.
- 6.

7. Point the huge pipe antenna coil towards the location of the transmitters , or try swing it sideways slowly to find the right spot. At the same time turn the knob of the variable capacitor to tune to a station.
8. If your window is facing a wide open space you should be able to tune to a station. If your window is blocked by another building, then then the signal may be weaken. But keep trying.
9. Once you find the best spot, you can try moving the yellow crocodile clamp up or down to the the other tabs to see if you can get a louder signal. Depending on the actual situation, you may need to make more tabs on the other turns to get the loudest signal. Also, by connecting to different tabs, you can tune into other part of the AM radio frequency to tune into more radio stations.
10. Good Luck and Happy Listening.

Posted 12th April 2013 by [Billy](#)

0 Add a comment



4th April 2013

Battery-free Hat Crystal Radio

Continuing on with the **Umbrella Crystal Radio** [<http://billydiy.blogspot.hk/2013/04/umbrella-crystal-radio.html>] , Billy's DIY Dreamshop brings you the **Battery-free Hat Crystal Radio**.

Inspired by my friend, and following the similar concept as the umbrella radio, I want to shrink the spiderweb coil from 1 meter in diameter down to 0.3 meter. This will fit nicely on something you can wear, for example a hat or a necklace.

And I did it! Though the audio output level is only half of that of the umbrella radio you can listen clearly to 3 HK local radios from an open area.

Now, you can wear a hat and listen to radio! Just make sure you point your hat at the direction of the radio transmitters see this link. [Hong Kong AM Radio Stations and Transmission Locations](http://billydiy.blogspot.hk/2013/04/hong-kong-am-radio-stations-and.html) [<http://billydiy.blogspot.hk/2013/04/hong-kong-am-radio-stations-and.html>]

You can follow the instructions below to make this.

Remember to leave me some comments (at the comment box) at the bottom of this if you have read this blog.

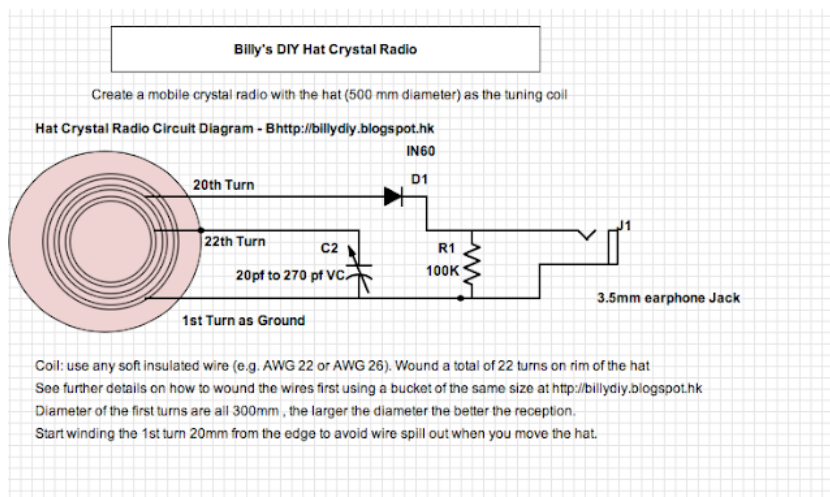


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[http://2.bp.blogspot.com/-mWIF75qeyqc/UV0h93b_m-I/AAAAAAAAA2Y/N2k7vBZbKml/s1600/IMG_1235.JPG]

CIRCUIT DIAGRAM



[\[http://3.bp.blogspot.com/-CeHfFT2VkjA/UXFXAFbEoFI/AAAAAAAAABDg/o53mpWT9XA/s1600/Screen+Shot+2013-04-19+at+10.38.24+PM.png\]](http://3.bp.blogspot.com/-CeHfFT2VkjA/UXFXAFbEoFI/AAAAAAAAABDg/o53mpWT9XA/s1600/Screen+Shot+2013-04-19+at+10.38.24+PM.png)

Parts you'll need.

1. A straw hat with a diameter of 500mm or above, the larger the diameter, the louder will be your radio. The following instructions assumes a 500mm-diameter hat. Adjust the length of wires you need accordingly if you have a bigger hat.
2. Any thin wire of any thickness to wound a coil of 22 turns and diameter 300mm around the hat.
3. Diode IN60,
4. Resistor 100K,
5. 270pf or 360pf Variable Capacitor (you can get it from an old radio if you cannot buy it),
6. 3.5mm earphone jack,
7. 1.5 meter of thin wires in three different colours (black for earth, red for antenna, orange for detector)
8. Three crocodile clamps of the same colours.
9. A transparent plastic case for the crystal radio. 60mmx40mmx20mm
10. A crystal earphone. If you do not have it, you can buy it from amazon or e-Bay (around HKD 100 including all the handling fees) or make one yourselves at HKD 10 following the instructions from my other blog posting here:

[How to make a crystal earphone for crystal radios](http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062) [\[http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062\]](http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062)



[\[http://2.bp.blogspot.com/-](http://2.bp.blogspot.com/-ALf15x9ipP0/UV0zuFSOrRI/AAAAAAAAA38/Xf4NU5Wtze4/s1600/Screen+Shot+2013-04-04+at+4.02.38+PM.png)

[ALf15x9ipP0/UV0zuFSOrRI/AAAAAAAAA38/Xf4NU5Wtze4/s1600/Screen+Shot+2013-04-04+at+4.02.38+PM.png\]](http://2.bp.blogspot.com/-ALf15x9ipP0/UV0zuFSOrRI/AAAAAAAAA38/Xf4NU5Wtze4/s1600/Screen+Shot+2013-04-04+at+4.02.38+PM.png)

11. Twenty five meters of any wires protected by rubber stealth. I used the AWG 22 plastic wire. You can also use AWG 26 which is thinner and lighter. However, the thicker the wire, the more radio wave you capture and the higher sensitivity and higher audio output.



[[http://2.bp.blogspot.com/-](http://2.bp.blogspot.com/-rYyEBQEY_B4/UVmUKnniVil/AAAAAAAAA0Q/ua6obT96AQ/s1600/IMG_1200.JPG)

[rYyEBQEY_B4/UVmUKnniVil/AAAAAAAAA0Q/ua6obT96AQ/s1600/IMG_1200.JPG](http://2.bp.blogspot.com/-rYyEBQEY_B4/UVmUKnniVil/AAAAAAAAA0Q/ua6obT96AQ/s1600/IMG_1200.JPG)]

You can get most of these from electronic shops in Shamshupo, except the variable capacitor. You can easily buy some old recycled walkman with radios for HKD20-50 from the hawkers in Ip Liu Street in Sham Shui Po. The other way is to go to taobao.com to buy them online and ship to HK. The goods is RMB 5, but the shipping fees is minimum RMD 30, so not worth it unless you buy in great quantity. For the Crystal Earphone, it's very hard to buy nowadays. Refer to my other post to make one yourselves. [DIY Crystal Earphone for Crystal Radios](http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html) [<http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html>]

TOOLS

1. Solder Iron
2. Leather hole puncher for cutting 2mm holes. The paper hole puncher is too big. You can use a nail to cut the hole if you do not have the leather hole puncher.

HOW TO MAKE IT.

A. Create the Hat Antenna

1. First let's create the hat antenna. Use the hole cutter or a sharp object to cut two small holes on the rim of the hat at least 20mm from the edge. This is for tying the wire to hold the coil in place. Repeat this at the five other places around the hat so you can hold the coil firmly later on.



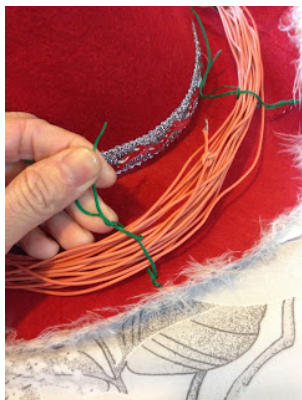
[http://4.bp.blogspot.com/-893XFDdMYdM/UV0k8P5IzoI/AAAAAAAAA2o/SIgSne79_kA/s1600/IMG_1221.JPG]

2. Find a round bucket or rubbish bin around the same size as the coil you are going to wind. Then wind the coil using the thin wire. Total 22 turns. When finish, use the twist tie or wires to tie the coil at the six places to hold it in place and also later on to mount onto hat.



[http://3.bp.blogspot.com/-VfkbZ_4bKJk/UV0mzG47ivI/AAAAAAAAA20/cCv0k944h1k/s1600/IMG_1239.JPG]

3. Mount the coil onto the hat by tying the twist tie or wires onto the six pair of holes you created in step A1.



[http://3.bp.blogspot.com/-C-ZN1turigQ/UV0oNC7Q0aI/AAAAAAAAA3E/Zwe--tYUIQ/s1600/IMG_1240.JPG]

4. Create Tabs for connection to the Crystal Radio set at the following turns.

- Turn 0 - Beginning of the coil
- Turn 18
- Turn 20
- Turn 22 - End of the coil.



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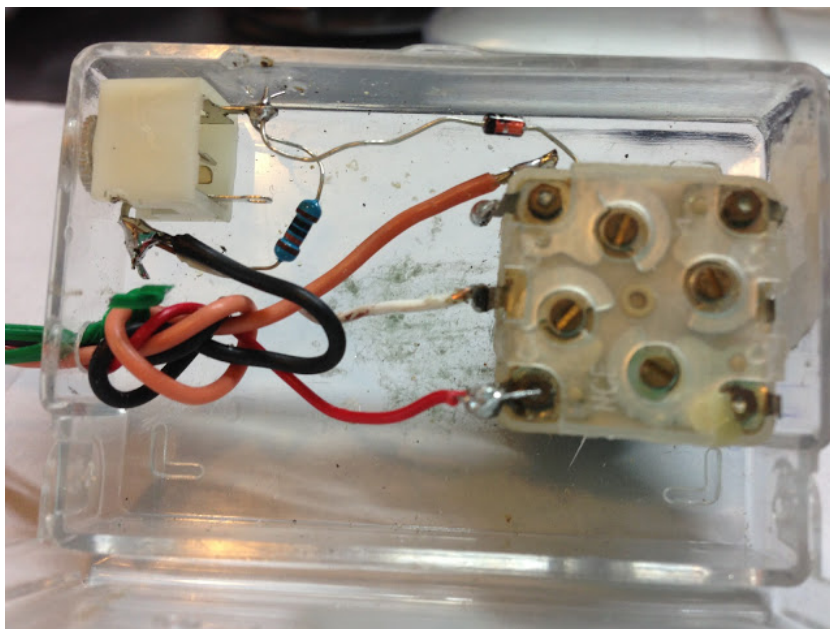
The inductance of the coil is around 338 uH



[http://1.bp.blogspot.com/-gTuPjJ-sELo/UWLnugq3oDI/AAAAAAAAA9Y/qPrKbJeMfs0/s1600/IMG_1275.jpg]

B. Make the crystal radio (without the coil).

1. Drill holes on the plastic case to fit the earphone jacks, variable capacitor knobs, and one more hole to pass the wires for the crocodile clamps.
2. Mount the earphone jacks and the variable capacitor onto the case and fasten the screws.
3. Refer to the circuit diagram and the real life wiring photo, solder the parts together.
4. Connect a black wire to the ground of the Jack and connect the other end to a black crocodile clamp.
5. Connect a red wire to the tip C1 of the variable capacitor.
6. Connect an orange wire to the diode and connect the other end to a yellow crocodile clamp.



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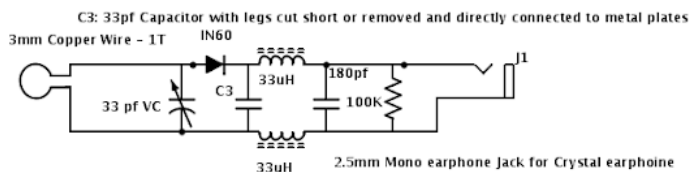
C. Put the hat antenna and the crystal radio together.

1. Hang the crystal radio from hat, or on the rim of the hat using a piece of wire to tie it.
2. Connect black crocodile clamp from crystal radio (for ground) to the tab of the turn 0 (beginning of the coil).
3. Connect the red crocodile clamp (for tuning) to the tab of the 22 th turn (end of the coil).
4. Connect the yellow crocodile clamp (for detector) to the tab of the 20th turn.
5. Plug a crystal earphone to the earphone jack of the radio.
6. Bring the hat down to the street and find an empty space, or get close to the window
7. This crystal radio does not require an earth, so you can walk freely on the street
8. Point the hat towards the location of the transmitters , or try swing it sideways slowly, and up and down to find the right spot. At the same time turn the knob of the variable capacitor to tune to a station.
9. If you have a wide open space you should be able to tune to a station. Then continue to adjust the angle of the hat to find the direction with the best reception.
10. Once you find the best spot, you can try moving the yellow crocodile clamp down to the the 18th tabs to see if you can get a louder signal. Depending on the actual situation, you may need to make more tabs on the other turns to get the loudest signal.

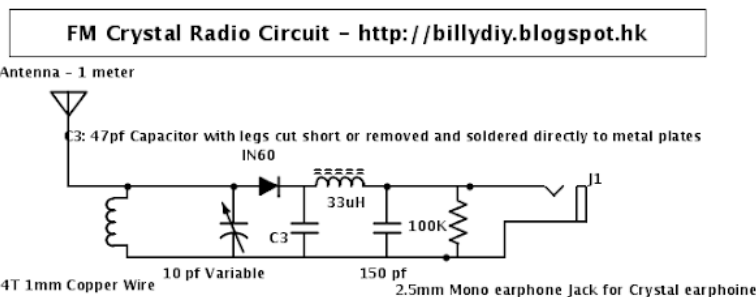
Next

I will try to build an FM Crystal radio. There are different circuits being tested.

Antenna-Free FM Crystal Radio Circuit - <http://billydiy.blogspot.hk>



[http://2.bp.blogspot.com/-tAEUrg9BlrM/UV2r9jTn_0I/AAAAAAAAA84/UKfMMMHNDqA/s1600/Screen+Shot+2013-04-05+at+12.33.07+AM.png]



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Posted 4th April 2013 by [Billy](#)

0 Add a comment

1st April 2013

Battery-free Umbrella Crystal Radio

Create a battery free, crystal radio using an umbrella as the tuning coil which doubles up as a powerful spiderweb antenna.

You can now walk down the beach with this umbrella crystal radio.
Enjoy sun bathing while listening to the crystal radio!

The umbrella coil can double up as a super strong spiderweb antenna for testing your crystal radio even at home!
Just put the umbrella antenna close to your window and point to the direction of the radio transmission station.

Checkout this Youtube video:

http://www.youtube.com/watch?v=MEIL_0lpV4 [http://www.youtube.com/watch?v=MEIL_0lpV4g]

I have done one more field test of the radio.

<http://www.youtube.com/watch?v=fYvUTIYZ43I>

Remember to leave me some comments (at the comment box) at the bottom of this if you have read this blog.

What is a Crystal Radio

Crystal radio is a the simplest radio that runs purely on energy captured from the radio wave and do not require a battery or other forms of electricity supply.

Radio signals are transmitted by the radio stations in HK, e.g. RTHK or Commercial Radio , or the Metro radio, or even from stations across the border from mainland China. See here for details

[Hong Kong AM Radio Stations and Transmission Locations](http://billydiy.blogspot.hk/2013/04/hong-kong-am-radio-stations-and.html) [<http://billydiy.blogspot.hk/2013/04/hong-kong-am-radio-stations-and.html>]

I made crystal radio since I was a teenager. At that time I used to fail, because getting a good antenna set up was and still is a challenge in a concrete jungle like Hong Kong especially if you are living in a high rise apartment; and you are not rich enough to own the roof (i.e. me). Now I can resolve this issue with this umbrella radio that doubles up as a powerful antenna!



[http://3.bp.blogspot.com/-Ekdw-4ecSNU/UypvDTcNzQI/AAAAAAAAABIY/dBdn7ASU8ZY/s1600/IMG_1757.JPG]

From Dream to Creation

I notice that there are lots of web postings for mobile crystal radios with huge antenna wound on a Cross made from meter long PVC pipes. This is great. However, the bulky set up is pretty bulky and very hard to transport around.

What if we can replace the cross with a meter-wide umbrella.

Turning on the crystal radio will be as easy as opening an umbrella.

That's how I started the creation of my first umbrella radios. Version 1 of the product (see below) was built in a rush in just 2 hours. It achieve the function to receive many radio stations and the signal is pretty strong too. However, it's built on a extra-large golf umbrella, and the wires are wound on tiny holes at the tip of the umbrella. So, wires tend to be exposed when you close the umbrella.



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Umbrella Antenna Version 1.

Then I think of better ways to wind the coil inside the umbrella and created umbrella crystal radio version 2.

So, now even if it's raining (and no lightning), I can open up the umbrella with the coil safely inside, and me happily listening to the musics from the crystal radio. I call it the Umbrella Crystal Radio.



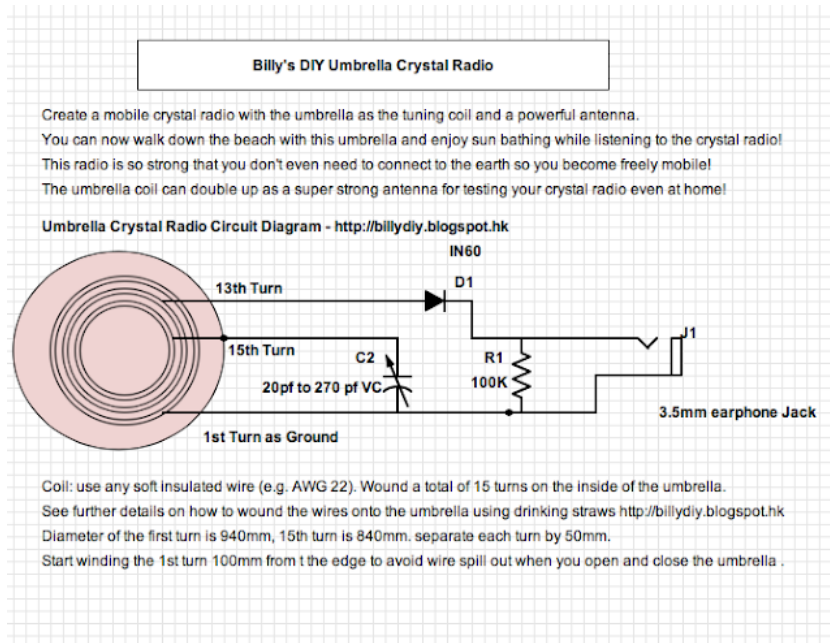
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Mounting the Umbrella radio on the fence, reception is super strong.

In this blog, I will show you how to build this umbrella crystal radio, please follow instructions part A, B, and C. If you already have an existing crystal radio, you can still use the umbrella as the antenna. Just follow part A to build the umbrella antenna, then jump to part D to use it as an antenna for your existing crystal radios. Just place the umbrella next to your window and point at the right direction to receive the radio waves.

Circuit Diagram



Parts you will need

1. An umbrella around 1 meter in diameter, 8 or more ribs.

The instructions below assumes that you have an umbrella of 8 ribs, and 1 meter in diameter.

You can choose the following types of umbrellas each with a different diameter. The bigger the diameter the better the radio reception, and the louder the radio. However, a regular umbrella of 900mm is good enough.

Diameter of different types of umbrellas (photo below from left to right):

Golf umbrella 1230 mm

Car umbrella 1180 mm

Large umbrella 1070 mm

Regular umbrella 900mm



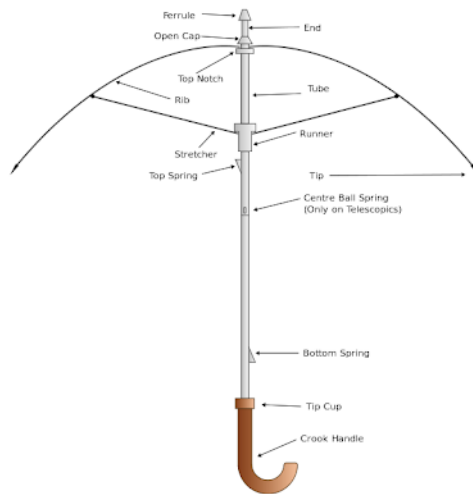
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[u4H0b1n0S7k/UVmk5XZCOGI/AAAAAAAAAZQ/30IQ-EwFZ98/s1600/Screen+Shot+2013-04-01+at+9.14.05+PM.png](http://1.bp.blogspot.com/-u4H0b1n0S7k/UVmk5XZCOGI/AAAAAAAAAZQ/30IQ-EwFZ98/s1600/Screen+Shot+2013-04-01+at+9.14.05+PM.png)]

2. 8 or more Drinking Straws of diameter 8mm, those from Mac Donald are perfect. You need as many as the number of ribs your umbrella has. Most umbrella has 8 ribs.



[http://2.bp.blogspot.com/-0mf8l_j4jFo/UVmVZW8yHbl/AAAAAAAAA0Y/lmJKk9N-JUI/s1600/IMG_1201.JPG]

3. Diode IN60,
4. Resister 100K,
5. 270pf or 360pf Variable Capacitor (you can get it from an old radio if you cannot buy it),
6. 3.5mm earphone jack,
7. 1.5 meter of thin wires in three different colours (black for earth, red for antenna, orange for detector)
8. Three crocodile clamps of the same colours.

9. Fifty meters of any regular electric wires. I used the AWG 22 plastic wire. You can also use AWG 26 which is thinner and lighter. However, the thicker the wire, the more radio wave you capture and the higher sensitivity and higher audio output.



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[rYyEBQEY_B4/UVmUKnniVil/AAAAAAAAA0Q/iua6obT96AQ/s1600/IMG_1200.JPG](http://2.bp.blogspot.com/-rYyEBQEY_B4/UVmUKnniVil/AAAAAAAAA0Q/iua6obT96AQ/s1600/IMG_1200.JPG)]

Dynamic Views theme. Powered by Blogger.

10. A transparent plastic case for the crystal radio. 60mmx40mmx20mm

11. A crystal earphone. If you do not have it, you can buy it from amazon or e-Bay (around HKD 100 including all the handling fees) or make one yourselves at HKD 10 following the instructions from my other blog posting here:

[How to make a crystal earphone for crystal radios](http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062) [<http://www.blogger.com/blogger.g?blogID=2311644141825422235#editor/target=post;postID=1827613235001197062>]



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You can get most of these from electronic ships in Shamshupo, except the variable capacitor. You can easily buy some old recycled walkman with radios for HKD20-50 from the hawkers in Ip Liu Street in Sham Shui Po. The other way is to go to taobao.com to buy them online and ship to HK. The goods is RMB 5, but the shipping fees is minimum RMD 30, so not worth it unless you buy in great quantity. For the Crystal Earphone, it's very hard to buy nowadays. Refer to my other post to make one yourselves. [DIY Crystal Earphone for Crystal Radios](http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html) [<http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html>]

Tools

1. Solder Iron
2. Leather hole puncher for cutting 2mm holes. The paper hole puncher is too big. You can use a nail to cut the hole if you do not have the leather hole puncher.

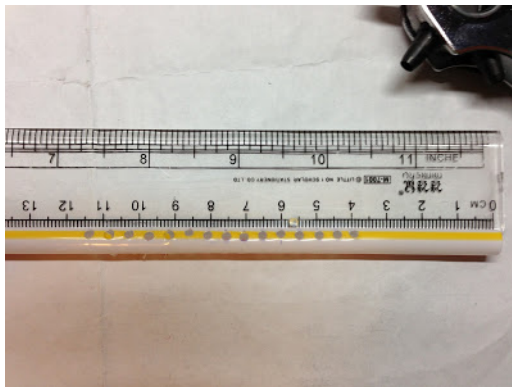


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How to make it.

A. Create the Umbrella Antenna

1. First let's create the umbrella antenna. Use the hole cutter to cut fifteen 2 mm holes on the drinking straw. You may want to mark it first with your ruler before cutting. Start from 40mm, then mark the hole to be cut every 5mm until you reach 115mm.



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[http://2.bp.blogspot.com/-IkJ5UFcGkPA/UVmXeszhaLI/AAAAAAAAA00/ezbyv5yixE/s1600/IMG_1159.JPG]

2. At each hole cut a slanting slot on the side of the straw so it'll be easier to pull the wire over.



[http://4.bp.blogspot.com/-RGxWhist1V0/UYPQqRjwJjI/AAAAAAAAABE0/mS6yv3Vzj_c/s1600/IMG_1697.JPG]

This is how a finished straw looks.



[http://1.bp.blogspot.com/-YdDRP_1dImY/UYPQwKXCcOI/AAAAAAAAABE8/sC39Oolj0vg/s1600/IMG_1698.JPG]

3. Remove all 8 tips from the ribs of the umbrella. Insert the straws into the rib, then put the tip back on again.

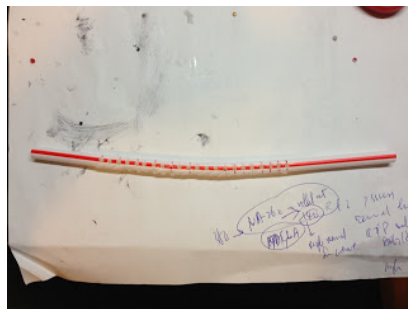


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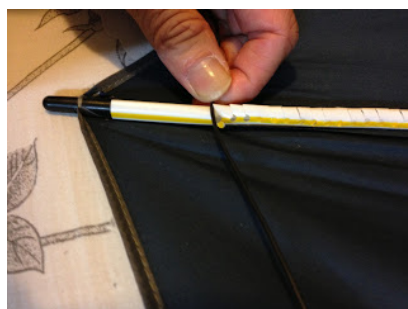


[http://3.bp.blogspot.com/-qH__j-4e3ZY/UVmYCwPvb8I/AAAAAAAAA1A/J27ffuqfTaA/s1600/IMG_1166.JPG]

4. Wind the coil by by pressing the wire in the slanted openings to the holes of the drinking straw. Lock the wire securely into the hole before going for the next turn.



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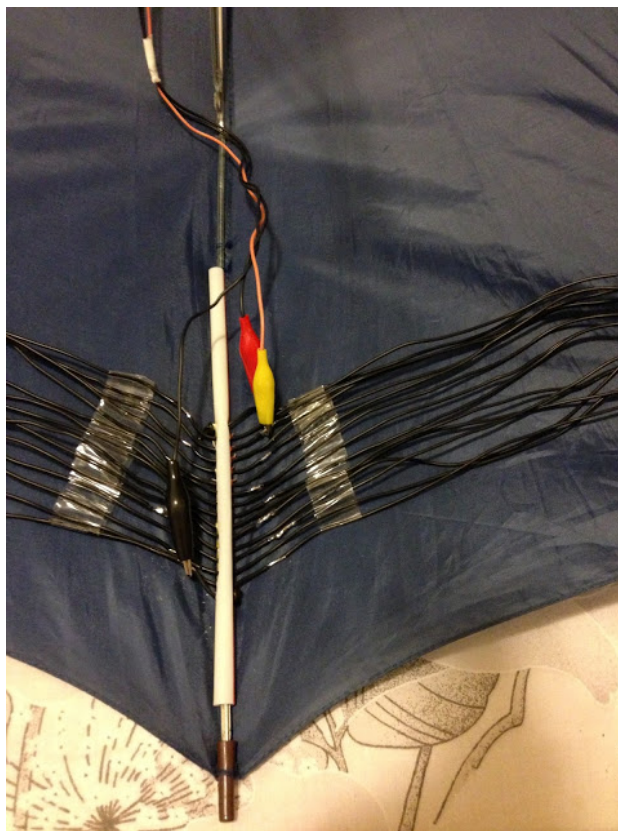


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[http://2.bp.blogspot.com/-fqvkB6WE_QQ/UVmZjX_XpKI/AAAAAAAAA1U/gm6HY_su50w/s1600/IMG_1198.JPG]

5. Create the tabs for the coil for tuning by cutting the insulating rubber of the wire to expose the copper inside. To avoid the adjacent wire touching one another, you can create the tabs of the odd number of turns on the left side, and the even number of turns on the right side. If you have a solder iron, put some solder on to the copper to avoid the stealth covering up the copper again.



[http://1.bp.blogspot.com/-jDdljBxQIWk/UVmb5RZspI/AAAAAAAAA1g/DBXQnyD2all/s1600/IMG_1199.JPG]

The inductance of the completed umbrella coil should be around 300uH, you can measure it if you have an inductance meter. Otherwise, you can determine if you can tune into most of the radios.

If the inductance is too high, i.e. you cannot tune to stations at the high end (towards 1700 KHz) , remove some turns.

If the inductance is too low, i.e. you cannot tune to stations at the low end (towards 500 KHz) , add some turns.

6. To avoid the wires slipping through the openings on the straw, apply some glue there to close the gap.

B. Make the crystal radio (without the coil).

1. Drill holes on the plastic case to fit the earphone jacks, variable capacitor knobs, and one more hole to pass the wires for the crocodile clamps.

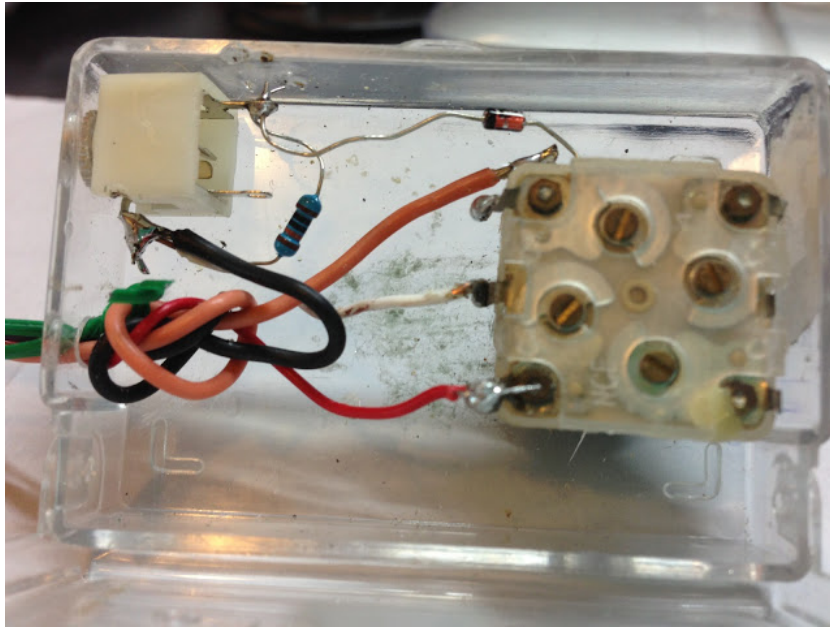
2. Mount the earphone jacks and the variable capacitor onto the case and fasten the screws.

3. Refer to the circuit diagram and the real life wiring photo, solder the parts together.

Connect a black wire to the ground of the Jack and connect the other end to a black crocodile clamp.

Connect a red wire to the tip C1 of the variable capacitor.

Connect an orange wire to the diode and connect the other end to a yellow crocodile clamp.



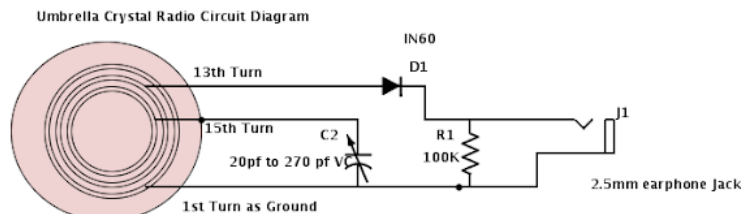
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C. Put the umbrella antenna and the crystal radio together.

1. Hang the crystal radio from the handle of the umbrella using a piece of wire to tie it.
2. Connect black crocodile clamp from crystal radio (for ground) to the tab of the 1st turn (closest turn to the edge of the umbrella).
3. Connect the red crocodile clamp (for tuning) to the tab of the 15th turn (innermost turn).
4. Connect the yellow crocodile clamp (for detector) to the tab of the 13th turn.
5. Plug a crystal earphone to the earphone jack of the radio.
6. Bring the umbrella down to the street and find an empty space, or get close to the window.
7. This crystal radio does not require an earth, so you can walk freely on the street.
8. Point the umbrella towards the location of the transmitters, or try swing it sideways slowly, and up and down to find the right spot. At the same time turn the knob of the variable capacitor to tune to a station.
9. If you have a wide open space you should be able to tune to a station. Then continue to adjust the angle of the umbrella to find the direction with the best reception.
10. Once you find the best spot, you can try moving the yellow crocodile clamp down to the other tabs to get a louder signal. e.g. Try the 10th Turn or even 7th turn and so on.
11. Some times, the inductance of the umbrella antenna may be too high, you may also want to try moving the RED crocodile clamp down some turns too, e.g. try the 13th turn, or even 10th turn to find the best matching frequency to tune to a station.



Coil: use any soft wire (e.g. AWG 22) insulated by rubber. Wound a total of 15 turns on the inside of the umbrella. See further details on how to wound the wires onto the umbrella using drinking straws <http://billydiy.blogspot.hk>
 Diameter of the first turn is 940mm, 15th turn is 840mm. separate each turn by 50mm.
 Start winding the 1st turn 100mm from the edge to avoid wire spill out when you open and close the umbrella.

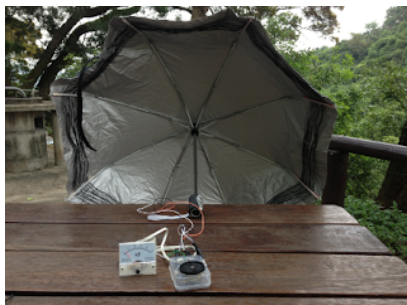
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D. Use the umbrella antenna for your existing crystal radio.

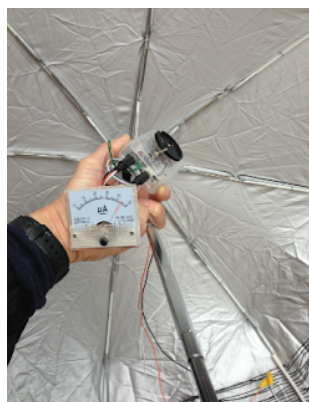
1. Hang your existing crystal radio from the handle of the umbrella using a piece of wire to tie it.
2. Using a crocodile clamp, connect the crystal radio's antenna wire to the tab of the 1st turn (outermost turn).
3. If your crystal radio also need an earth connection, connect the wire to earth. Or if you want to try it on the street, hold the earth wire of your crystal radio by your bare hand to create an earth. Or, you can connect the earth wire to some metal poles, fences or benches that touches the ground.
4. Plug a crystal earphone to the earphone jack of the radio.
5. Bring the umbrella down to the street and find an empty space, or get close to the window.
6. Point the umbrella towards the location of the transmitters, or try swing it sideways slowly, and up and down to find the right spot. At the same time turn the knob of the variable capacitor to tune to a station.
7. If you have a wide open space you should be able to tune to a station. Then continue to adjust the angle of the umbrella to find the direction with the best reception.
8. Once you find the best spot, you can try moving the yellow crocodile clamp down to the other tabs to get a louder signal. e.g. Try the 10th Turn or even 7th turn and so on.
9. Some times, the inductance of the umbrella antenna may be too high, you may also want to try moving the RED crocodile clamp down some turns too, e.g. try the 13th turn, or even 10th turn to find the best matching frequency to tune to a station.

Testing Result

I tested this umbrella radio next to the sea. The radio is very loud, and recorded a record high DC current of 44uA. A regular crystal radio at home will only get around 4uA.



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What's Next?

I also made this super large golf umbrella radio in much the same way. Only difference is the umbrella size is 1180mm in diameter.



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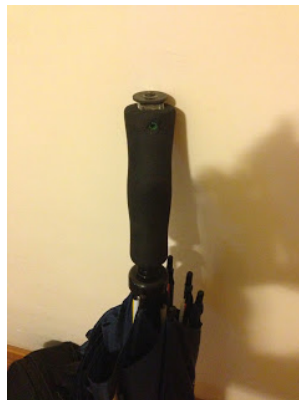
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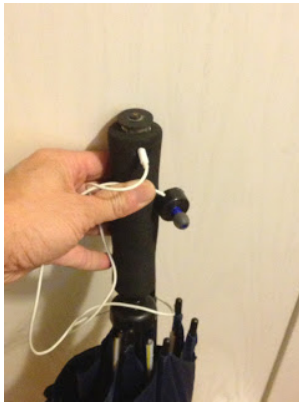
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[http://2.bp.blogspot.com/-e7oVdxICzW4/UYjh8jo8rCI/AAAAAAAAABIA/npMLfxZpNwo/s1600/IMG_1754.JPG]



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[http://4.bp.blogspot.com/-_w5Ohp5JgbE/UYjh5P6WFEI/AAAAAAAABG4/FXsEHD5EhTY/s1600/IMG_1746.JPG]



[http://1.bp.blogspot.com/-8v9N5j7h2OU/UYjh5IfWN2I/AAAAAAAABG8/xEhTx3e0eJk/s1600/IMG_1747.JPG]



[http://2.bp.blogspot.com/-yls4zhs3ptQ/UYjh6jyFael/AAAAAAAABHM/3pWsnknSOrk/s1600/IMG_1748.JPG]

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Posted 1st April 2013 by [Billy](#)

0

Add a comment

1st April 2013 Hong Kong AM FM Radio Frequencies and Transmitter Locations

Crystal Radios is perfect for AM and recently crystal radio can also cover FM in locations close to the FM transmitting locations, or with FM radio antenna and FM radio signal amplifiers.

Here is a web site that listed all radio broadcast stations in the world.

<http://www.asiawaves.net/hong-kong-radio.htm>

Radio Broadcast Stations in Hong Kong

The following information is extracted from a web site that listed all radio broadcast stations in the world. Please refer this in detail.

<http://www.asiawaves.net/hong-kong-radio.htm>

Information below is © Copyright Alan G. Davies 1999-2009, all rights reserved.

I have extracted the info for Hong Kong.

Radio Television Hong Kong (RTHK) [<http://www.rthk.org.hk/>]

Broadcasting House
30 Broadcast Drive
Kowloon
Hong Kong

Tel: +852 2339 6300
Fax: +852 2336 9314

- RTHK Radio 1: in Cantonese / Mandarin on 92.6-94.4 MHz
- RTHK Radio 2: in Cantonese on 94.8-96.9 MHz

- RTHK Radio 4: in English & Cantonese on 97.6-98.9 MHz
- RTHK Radio 5: in Cantonese / Mandarin on 783 kHz and 92.3, 99.4 & 106.8 MHz
- RTHK Radio 6: relays BBC World Service in English 24h on 675 kHz
- RTHK Radio 7 (Putonghua Channel): in Mandarin on 621 kHz and 100.9 & 103.3 MHz

All networks operate 24h, but some may carry merged programming at times during local evenings and overnight.

Hong Kong Commercial Broadcasting Company Ltd (HKCR) [http://www.crhk.com.hk/]

3 Broadcast Drive
Kowloon
Hong Kong

Tel: +852 2336 5111
Fax: +852 2338 0021

- HKCR CR1 (Supercharged 881): in Cantonese on 88.1-89.5 MHz
- HKCR CR2 (Ultimate 903): in Cantonese on 90.3-92.1 MHz
- AM 864 in English and limited Nepalese on 864 kHz

All networks operate 24h

Metro Broadcast Corporation Ltd [http://www.metroradio.com.hk/]

Basement 2
Site 6, Whampoa Gardens
Hung Hom
Kowloon
Hong Kong

Tel: +852 2123 9888
Fax: +852 2123 9877

- Metro Info: in Cantonese on 99.7-102.1 MHz
- Metro Finance: in Cantonese on 102.4-106.3 MHz
- Metro Plus: in English, Mandarin, Filipino, Hindi and Indonesian on 1044 kHz AM Stereo

Mediumwave (AM) Radio Frequencies in Hong Kong

Mediumwave (AM)
Radio Frequencies
in Hong Kong

Frequency (kHz)	Network	Site	Power (kW)
567 kHz	RTHK3	Golden Hill	20 kW
621 kHz	RTHK Putonghua Channel	Golden Hill	20 kW
675 kHz	RTHK6 (BBC World Service)	Peng Chau	1 kW
783 kHz	RTHK5	Golden Hill	20 kW
864 kHz	HKCR AM864	Peng Chau	10 kW
1044 kHz	Metro Plus	Peng Chau	10 kW
1584 kHz	RTHK3	Chung Hom Kok	0.1 kW

FM Radio Frequencies in Hong Kong

(Frequencies in MHz; TRP = transmitter power, ERP = maximum effective radiated power)

Target Area	Site	RTHK1	RTHK2	RTHK4	HKCR1 (Supercharged 881)	HKCR2 (Ultimate 903)	Metro Info	Metro Finance	TRP (kW)	ERP (kW)
Fan Ling	Cloudy Hill	93.7	95.3	97.8	88.3	90.7	100	104.7		0.5 kW

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Hong Kong Island	Kowloon Peak	94.4	96.9	98.9	89.5	92.1	101.8	106.30.5 kW	1 kW
(North), Sai Kung									
Hong Kong Island	Lamma Island	93.6	96	98.2	89.1	91.6	102.1	104.50.3 kW	0.5 kW
(South)									
Kowloon	Mt Gough	92.6	94.8	97.6	88.1	90.3	99.7	1041 kW	3 kW
Sha Tin	Beacon Hill	93.5	96.3	98.1	89.2	91.1	100.5	102.40.1 kW	0.15 kW
Tsuen Wan	Golden Hill	92.9	95.6	98.4	88.9	90.9	101.6	105.5	0.1 kW
Tuen Mun	Castle Peak	93.4	96.4	98.7	88.6	91.2	100.4	102.50.5 kW	0.7 kW

Additional local coverage on FM - frequencies in MHz, transmitter power (TRP) in kW:

- RTHK3: Mount Nicholson 97.9 MHz 0.02 kW
- RTHK3: Chung Hom Kok 106.8 MHz 0.06 kW
- RTHK3: Tin Shui Wai 107.8 MHz 0.0375 kW
- RTHK3: Tseung Kwan O [Junk Bay] 107.8 MHz 0.015 kW
- RTHK5: Tin Shui Wai 92.3 MHz 0.0375 kW
- RTHK5: Tseung Kwan O [Junk Bay] 99.4 MHz 0.015 kW
- RTHK5: Castle Peak 106.8 MHz 0.01 kW
- RTHK Putonghua Channel: Castle Peak 100.9 MHz 0.003 kW
- RTHK Putonghua Channel: Tai Hang Road 100.9 MHz 0.005 kW
- RTHK Putonghua Channel: Tin Shui Wai 103.3 MHz 0.0375 kW
- RTHK Putonghua Channel: Tseung Kwan O [Junk Bay] 103.3 MHz 0.015 kW
- Metro Info: Red Hill 101.0 MHz 0.005 kW
- Metro Finance: Red Hill 102.6 MHz 0.005 kW

Symphony of Lights: Narration accompanying the light show at 1200 UTC daily is transmitted for the Victoria Harbour area on 103.4 MHz (English), 106.8 MHz (Cantonese) and 107.8 MHz (Mandarin).

List of HK AM / MW RADIO Stations

567Khz 20kW [Radio 3 \(RTHK\)](http://www.rthk.org.hk/channel/radio3/) [also on FM - **Golden Hill** music variety/info English

621Khz 20kW [Putonghua Channel \(RTHK7\)](http://www.rthk.org.hk/rthk/putonghua.htm) [also on FM - **Golden Hill** Tsuen Wan news/oldies

675Khz 10kW [Radio 6 \(RTHK/BBCWS\)](http://www.rthk.org.hk/channel/radio6/) [also on FM - **Peng Chau** news, relays BBCWS English

747Khz [Radio Zhongshan AM Radio](http://www.zhongshanradio.com/zh-CN/introduce001.html) [also on FM - **Golden Hill** educational/cultural Cantonese

783Khz 20kW [Radio 5 \(RTHK\)](http://www.rthk.org.hk/channel/radio5/) [also on FM - **Golden Hill** educational/cultural Cantonese

864Khz 10KW HKCR AM864 -- Peng Chau - Fri/Sat - Philippines, others 24 hours songs.

942Khz [Shenzhen Radio Love FM](http://www.szr.com.cn/szmg_broadcast/index.do?a=942) [also on FM - **Golden Hill** educational/cultural Cantonese

1044Khz 10kW [Metro Plus \(Metro\)](http://www.metroradio.com.hk/) [also on FM - **Peng Chau** in English, Mandarin, Filipino, Hindi and Indonesian on 1044 kHz AM Stereo

1584Khz 0.1KW [Radio 3 \(RTHK\)](http://www.rthk.org.hk/channel/radio3/) [rep - **Chung Hom Kok** music variety/info English

Hong Kong Radio Transmitter Locations



[<http://2.bp.blogspot.com/-cotm0IPjw0I/UVI3c4TOEQI/AAAAAAAAAyw/P5Y3GTAhSNM/s1600/Screen+Shot+2013-04-01+at+7.59.47+PM.png>]

Posted 1st April 2013 by Billy

0 Add a comment

Bitdefender

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27th March 2013

DIY Crystal Earphone for Crystal Radios



[http://4.bp.blogspot.com/-W1q6NTSXpuU/UVLiirs6J_I/AAAAAAAAAx0/CAvQFcXxCG/s1600/Cyrstal+Earphone.png]

What is a Crystal Earphone

Crystal earphone also called Ceramic earphone/earpiece is the soul of crystal radios. They are one of a few types of earphones that are sensitive enough to produce sound from a Crystal Radio. Regular HIFI headphones will not work with a crystal radio. The Crystal radio runs without battery. It runs purely by the radio wave captured by the antenna and convert that into tiny electric current ($< 1\mu\text{A}$) that is yet sufficient to produce sound through the highly sensitive crystal earphone.

Wikipedia definition of Crystal Earphone [http://en.wikipedia.org/wiki/Crystal_earpiece]



[<http://2.bp.blogspot.com/-ALf15x9ipP0/UV0zuFSOrRI/AAAAAAAAA38/Xf4NU5Wtze4/s1600/Screen+Shot+2013-04-04+at+4.02.38+PM.png>]

The original crystal earphone (shown above) cannot be purchased in Hong Kong since 10 years ago. You can still buy it from UK through the online shopping sites, e.g. Amazon, or e-Bay, the cost is not too expensive, but the shipping cost alone will kill this idea. The total cost to buy one overseas may exceed HKD 120, for something valued around HKD 30 max.

SPECIFICATIONS of a Crystal Earphone:

- Impedance: 20K ohm
- Capacity: 15,000 pf
- Sensitivity: 57 dB at 1KHz
- Frequency Range: 200 ~ 8000 Hz

However, with some readily available components you can buy from HK Shamshui, Ip Liu Street, you make one yourselves at HKD 10 following the instructions here.

Remember to leave me some comments (at the comment box) at the bottom of this if you have read this blog.

Parts you'll need.

1. Piezo-Electric Buzzer (HK\$ 7).
2. Cut out 20mm of the tip from a used plastic ball pen (HK\$0).

3. A 2.5mm head Jack & wire from a used/broken headphone (HK\$0. If you don't have that, you can also buy some spare wires and a 2.5mm mono headphone Jack (the one in black below) (HK\$ 3).
4. A rubber earbud cousin from existing earbuds (top right on the picture below).



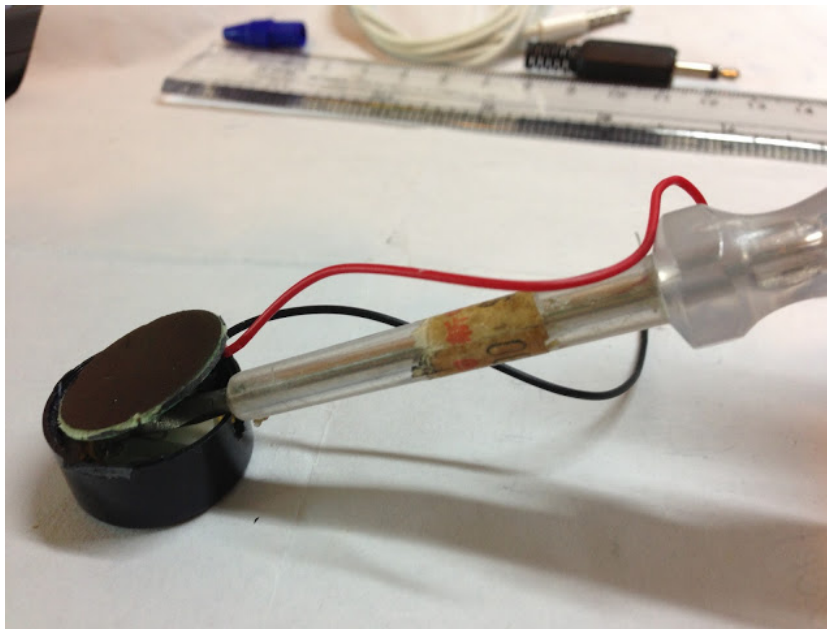
[<http://4.bp.blogspot.com/-W5ExpIIP2L0/UV1aUnwMazI/AAAAAAAAA6o/Hk0QoJe3pyQ/s1600/Screen+Shot+2013-04-04+at+6.46.24+PM.png>]

How to make it.

Watch this video or follow the instructions below:

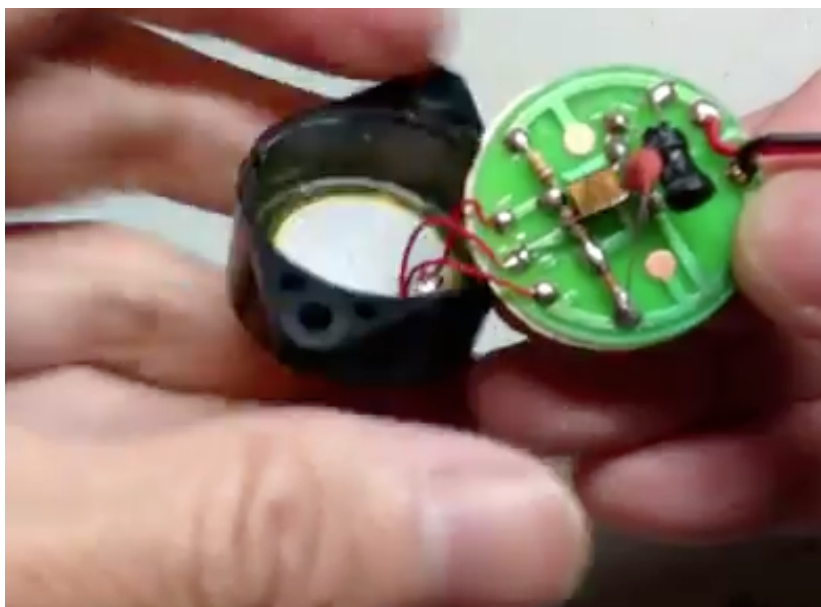
<http://www.youtube.com/watch?v=DjCKVAMJGlo> [<http://www.youtube.com/watch?v=DjCKVAMJGlo>]

1. Using a screwdriver and brutal force, remove the lid of the buzzer



[http://4.bp.blogspot.com/-7mKdE9pSAKE/UV1U9zeAK8I/AAAAAAAAA5M/BoCX_P18bT8/s1600/IMG_1246.JPG]

2. Find the Piezo-electric plate (the circle plate in gold and white and the circular circuit board with some other electronic components).



[http://2.bp.blogspot.com/-ZhHrjOlicT4/UV03KsrjOCI/AAAAAAAAA4M/iAA0YXY_9N8/s1600/Screen+Shot+2013-04-04+at+4.17.13+PM.png]

3. Remove all other electronic components using a solder iron and a clamp; as these components will reduce the impedance and also lower the audio output of the crystal earphone we are going to make.



[http://4.bp.blogspot.com/-u4SR5E_5NRI/UV1U91sn2hl/AAAAAAAAA5A/viQichGwxCw/s1600/IMG_1248.JPG]

This is how it looks after all the unnecessary electronic components have been removed from the circuit board.



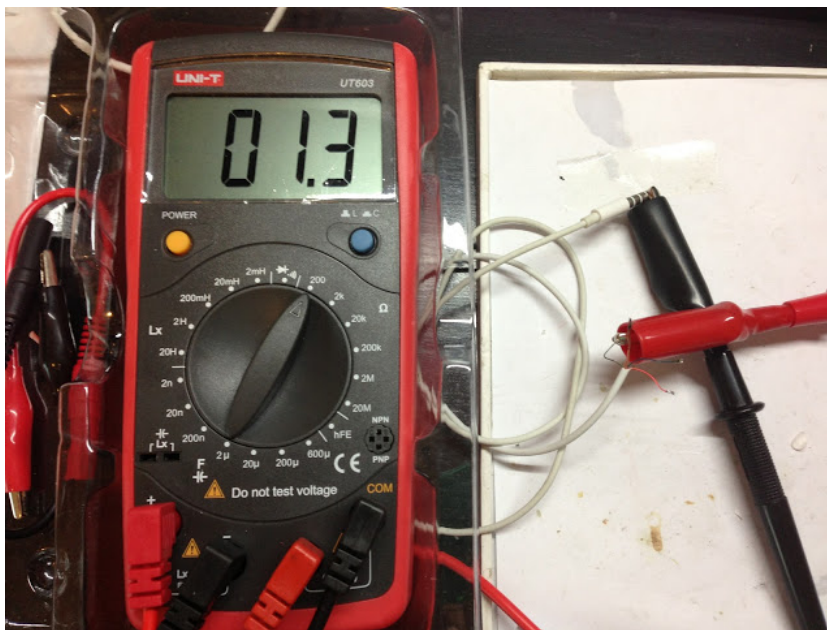
[http://1.bp.blogspot.com/-uC2t2vpXUus/UV1U-kz9wol/AAAAAAAAA5g/UKrFKi_8s9c/s1600/IMG_1251.JPG]

4. Using a solder iron, connect two wires from the earphone jack directly onto the two points on the plate. One wire touching the circumference (gold), a second wire touching the inner plate (white). There may be a third white plate which is smaller, connect the wire from there to the other bigger white plate to get maximum audio output. Polarity is not important. So, you can choose which wire to go where.



[http://3.bp.blogspot.com/-PqnLtCqYJ14/UV1U_ScG6vI/AAAAAAAAA5k/6vIkYKsyf-Y/s1600/IMG_1253.JPG]

5. If you are using a separate earphone jack, connect the other end of the wire to an 2.5mm mono headphone jack.
6. Before you close the lid, test the connections it by shorting the terminals of the jack together using a screw driver or touching the tip and the base of the earphone jack with a multimeter set to Ohm-meter. You should hear some "click" sounds each time you shorten the terminals of the jack.



[http://2.bp.blogspot.com/-f8bHtWE-d1Q/UV1U-4AXTNl/AAAAAAAAA5c/lP9i34Ay-u4/s1600/IMG_1252.JPG]

7. Close the lid and secure it by applying glue. Do not use the strong instant super glue. Use some regular glue so can still open up the lid later for maintenance in case the wire inside is broken.



[http://4.bp.blogspot.com/-AhGImtzQ604/UV1U_63a5WI/AAAAAAAAA6A/vWaW7oQGpBI/s1600/IMG_1254.JPG]

8. Line up the hole from the tip of the ball pen to onto the hole in front of the buzzer. Stick them together using instant super glue. The function of the ball pen tip is to focus the sound to the ear.



[http://3.bp.blogspot.com/-Dj7ICuYkL-Y/UV1U_3tn3tI/AAAAAAAAA5s/2ypnc_nQy_o/s1600/IMG_1255.JPG]

9. Attach the earbud cousin to the tip of the pen.



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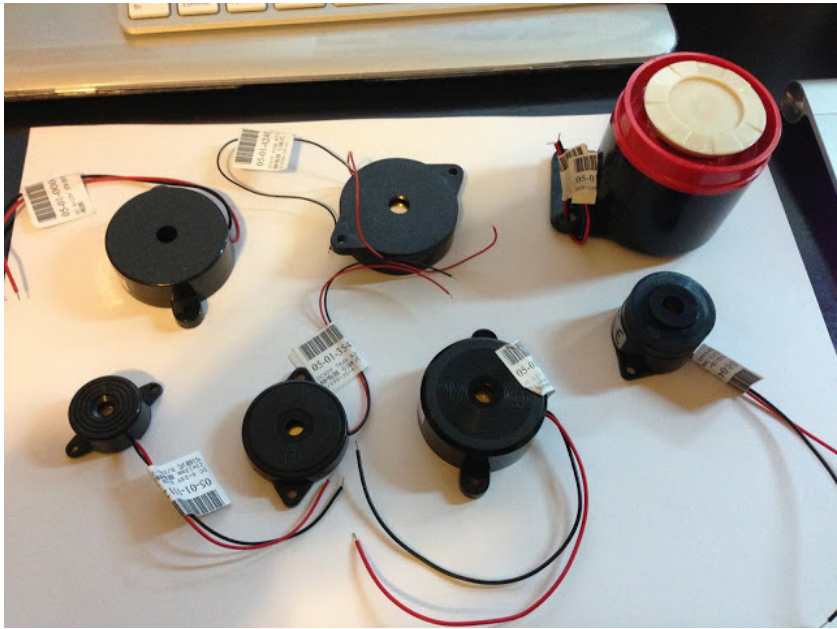
10. Connect it to your Crystal Radio to test.

My Library of Crystal earphones



[http://4.bp.blogspot.com/-o5FHwsGk9zl/UV1VB_VCCU/AAAAAAAAA6Q/7K2nNAodoGU/s1600/IMG_1259.JPG]

Different types of piezo-electric buzzer you can find



[http://1.bp.blogspot.com/-Z7tiVCPFr_8/UWLsPJUbPWI/AAAAAAAAA9o/HIYUHfVX-us/s1600/IMG_1276.JPG]

Posted 27th March 2013 by Billy

4 View comments

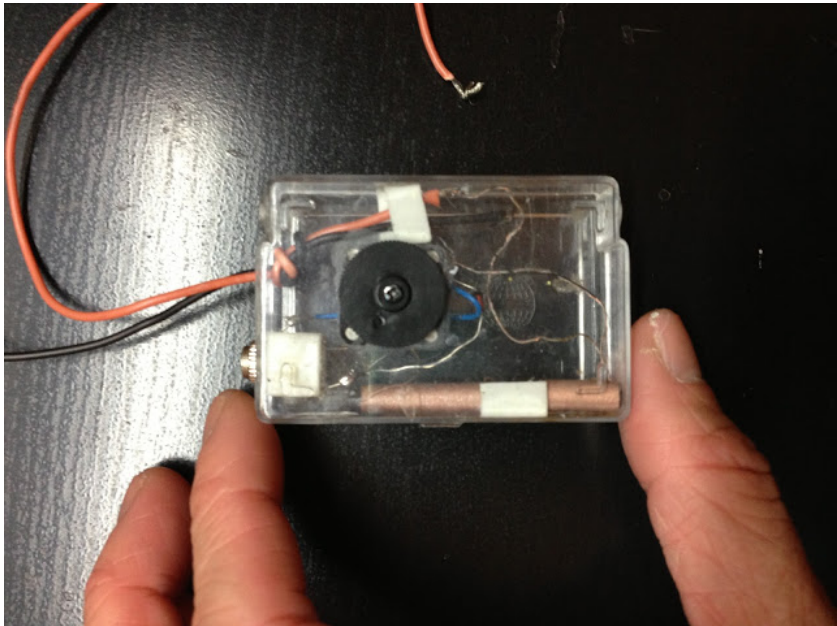
22nd March 2013

DIY - Battery-Free Tiny Crystal Radio

Build a Tiny Crystal Radio that runs without battery.

[http://www.blogger.com/blogger.g?blogID=2311644141825422235]
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[http://2.bp.blogspot.com/-FYzx5aqFfVM/UVGOaN0HeBI/AAAAAAAAAxQ/XQtWPgoL_VQ/s1600/IMG_1098

Parts you'll need

1. Variable Capacitor 360 pf - from an old radio.
2. Coil wound on a Ferrite Powder Rod - from an old radio e.g. old Walkman
3. A Crystal Earphone or a PC speaker with builtin amplifier.
4. Germanium Diode 1N60
5. Resistor 100 Kohm
6. 3.5mm earphone jack
7. A small plastic box,
8. some wires .
9. Solder iron.
10. Antenna - 20 meters hanging vertically or horizontally at a high location (Warning : Lightning Hazard)
11. Ground - connect a wire to your metal water pipe.

[\[http://www.blogger.com/blogger.g?blogID=2311644141825422235\]](http://www.blogger.com/blogger.g?blogID=2311644141825422235)



[\[http://4.bp.blogspot.com/-QqxK3OfVq4/UVLe8yWkFzI/AAAAAAAAAxo/4vtNVM1EUMY/s1600/parts.png\]](http://4.bp.blogspot.com/-QqxK3OfVq4/UVLe8yWkFzI/AAAAAAAAAxo/4vtNVM1EUMY/s1600/parts.png)

You can get most of these from electronic shops in Shamshupo, except parts #1,2 & 3.

For the variable capacitor and the coil you can easily buy some old recycled walkman or old radios for HKD20-50 from the hawkers in Ip Liu Street in Sham Shui Po. The other way is to go to taobao.com to buy them online and ship to HK. The goods is RMB 5, but the shipping fees is minimum RMD 30, so not worth it unless you buy in great quantity.

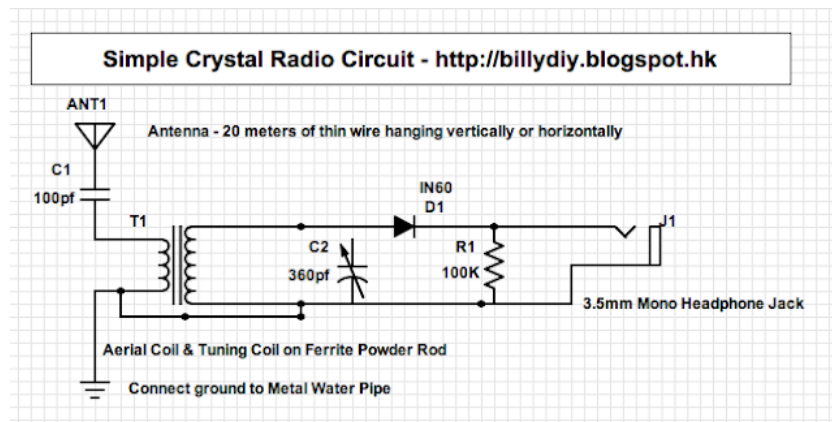
For the Crystal Earphone, it's very hard to buy nowadays. Refer to my other post to make one yourselves. [DIY Crystal Earphone for Crystal Radios \[http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html\]](http://billydiy.blogspot.com/2013/03/build-crystal-earphone-for-crystal.html)

Remember to leave me some comments (at the comment box) at the bottom of this if you have read this blog.

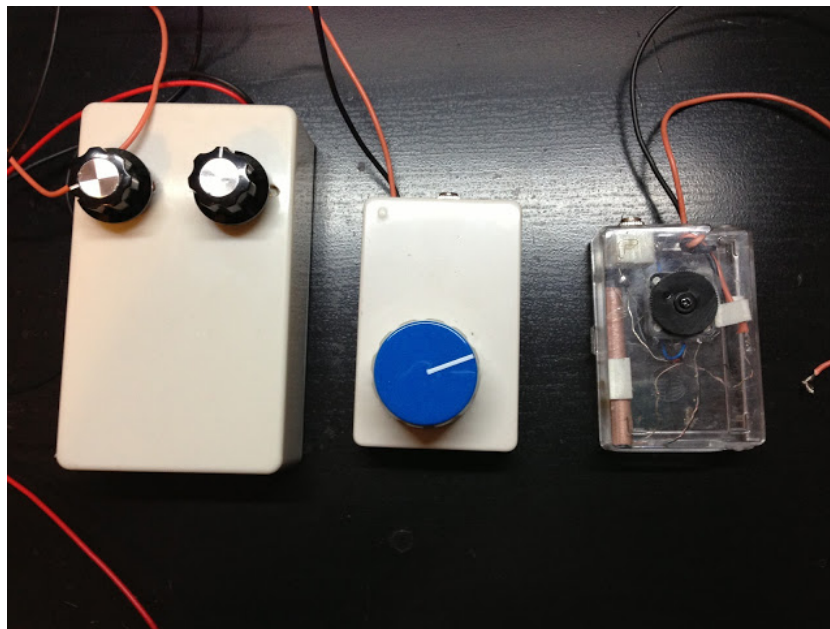
How to make it

<http://www.youtube.com/watch?v=6VsgXuNm13k>
[\[http://www.youtube.com/watch?v=6VsgXuNm13k\]](http://www.youtube.com/watch?v=6VsgXuNm13k)

Circuit Diagram



[<http://1.bp.blogspot.com/-C2qNgc8TvDg/UXFYJSUHmyI/AAAAAAAAABDw/KaD3xmUTk-w/s1600/Screen+Shot+2013-04-19+at+10.43.18+PM.png>]



[http://1.bp.blogspot.com/-6Ns9sST5X4s/UVGPUo-IFmI/AAAAAAAAAxY/up4TGDU0jC0/s1600/IMG_1097.JPG]